Railway Engineering Maintenance

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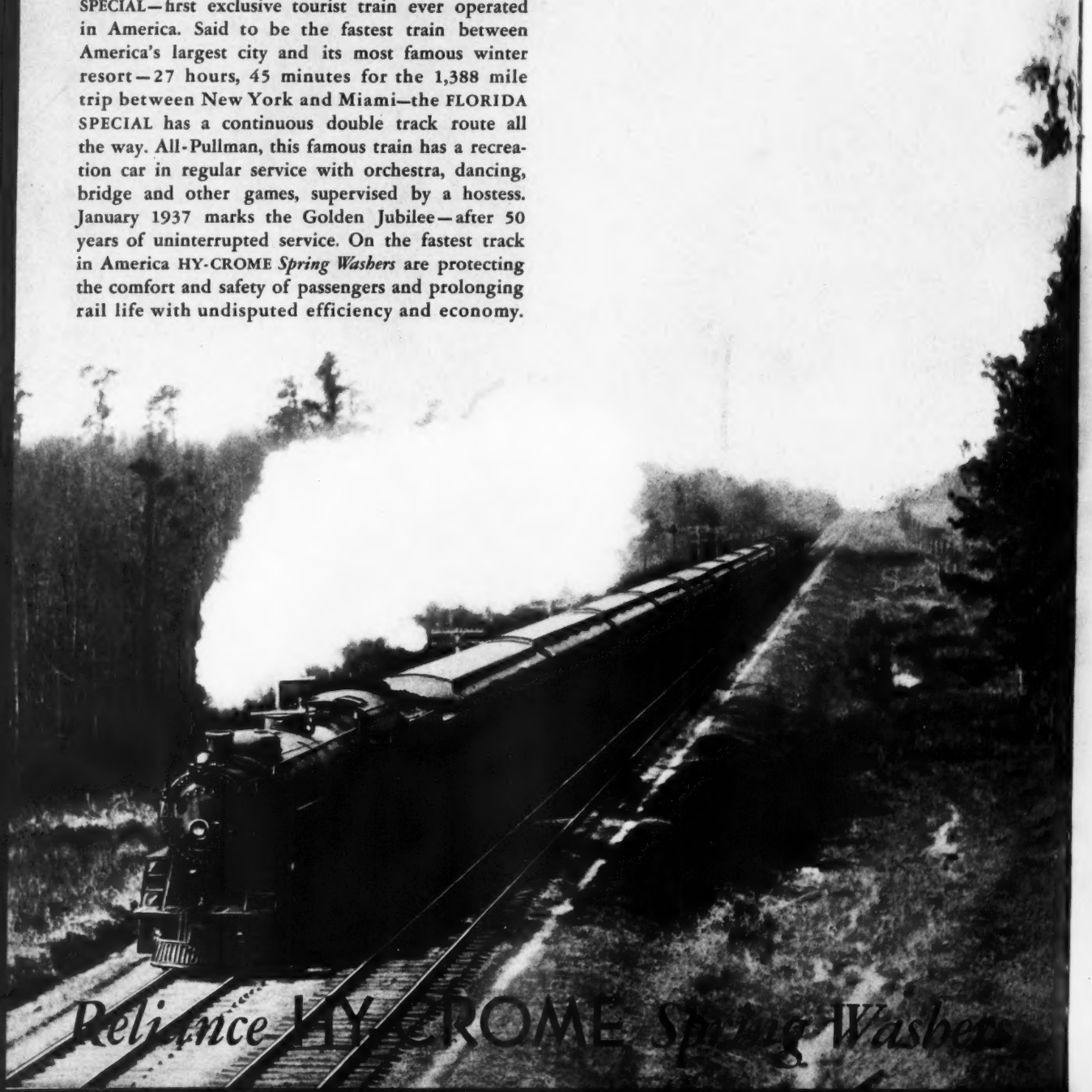
CONTROLLED BEARING JOINT
TIGHT CENTER

One of America's Famous Trains

FLORIDA SPECIAL

ATLANTIC COAST LINE RAILROAD COMPANY

SINCE the winter of 1887-1888, the Atlantic Coast Line Railroad Company has operated the FLORIDA SPECIAL—first exclusive tourist train ever operated in America. Said to be the fastest train between America's largest city and its most famous winter resort—27 hours, 45 minutes for the 1,388 mile trip between New York and Miami—the FLORIDA SPECIAL has a continuous double track route all the way. All-Pullman, this famous train has a recreation car in regular service with orchestra, dancing, bridge and other games, supervised by a hostess. January 1937 marks the Golden Jubilee—after 50 years of uninterrupted service. On the fastest track in America HY-CROME *Spring Washers* are protecting the comfort and safety of passengers and prolonging rail life with undisputed efficiency and economy.

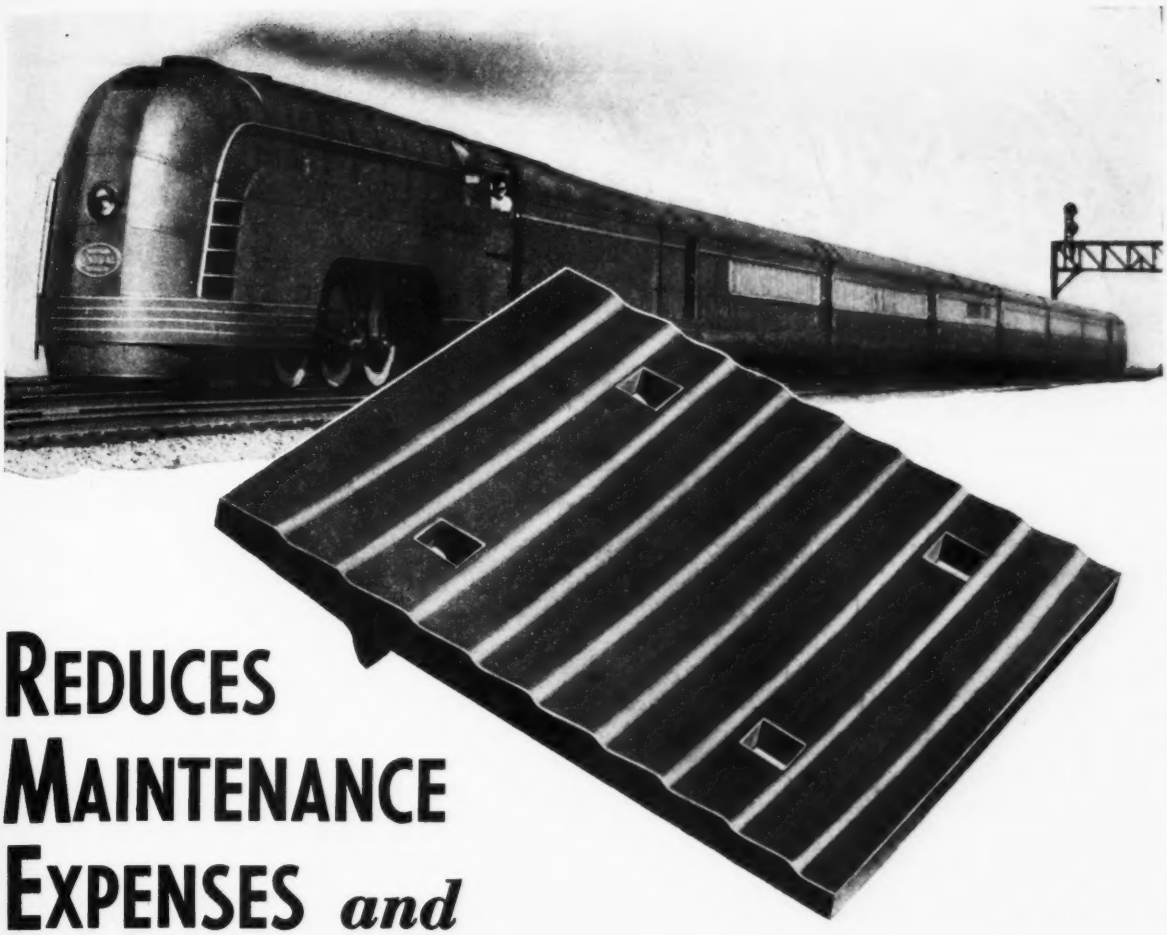


REActive Deflected	THACKERAY	HY-REACTION	STANDARD	HEAVY DUTY	DOUBLE	BONDING
Meets A. R. E. A. Spec.	For screw spike use	For track bolts	For general use	For frogs—crossings	For special use	Used as rail

CHECK

EATON MANUFACTURING CO. RELIANCE SPRING WASHER DIVISION, MASSILLON, OHIO

Sales Offices: New York • Cleveland • Detroit • Chicago • St. Louis • San Francisco • Montreal



REDUCES MAINTENANCE EXPENSES *and*

Prolongs Life of Ties and Rail

THE Lundie Tie Plate with its rounded steps of resistance holds track to gauge, and, most important of all, accomplishes this without injuring a single fibre of the tie. This scientifically designed plate provides tremendous holding power against plate movement and consequent spreading of track. The plate seats itself perfectly and gives proper inclination to rail so that wheels track properly . . . Lundie Plates are made with single or double shoulders to comply with A.R.E.A. specifications, or can be supplied to meet your own specifications. In preparing your 1937 budget, be sure to specify Lundie Tie Plates. They assure maximum return from investment in ties and rail.

THE LUNDIE ENGINEERING CORPORATION

19 West 50th St., New York 59 E. Van Buren St., Chicago

LUNDIE TIE PLATE

Published monthly by Simmons-Boardman Publishing Company, 105 W. Adams St., Chicago, Ill. Subscription price, United States and Possessions, and Canada, $2.00; Foreign $3.00. Single copies 35 cents. Entered as second-class matter January 20 1933, at the postoffice at Chicago, Illinois, under the act of March 3, 1879, with additional entry at Mt. Morris, Ill., postoffice. Address communications to 105 W. Adams St., Chicago, Ill.

PERFORMANCE ON THE JOB COUNTS

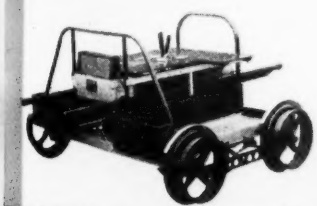
M19 SERIES D

ONE-TO-FOUR-MAN INSPECTION CAR . . . LIFT 96 POUNDS

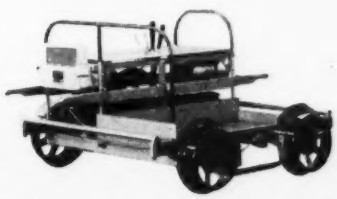
This Fairmont motor car is the easiest riding car on the rails. • It challenges comparison with special features found in no other one-to-four-man car. • Alco-Aluminum frame and 89 aluminum parts give it the lightest lifting weight of any car in this classification. • Extension handles extend either front or rear. • Lifting weight is 96 lbs., easy for one man. • Vertical spring mountings "float" the engine to eliminate vibration. • Spring-mounted body and deck—including axle box guides operating in "Oilite" bushings—smoothly cushion the ride. • Surplus powered by the famous Fairmont 5-8 H.P. engine, giving it unquestioned leadership in ratio of power to weight. • Equipped with demountable wheels to save 20% to 35% renewal cost . . . A rugged, spacious car with a record of 15 years of proved operating comfort and economy. • Load capacity up to 750 lbs. • It is significant that fundamental features of Fairmont design have been retained through long years of service. This fact proves conclusively that Fairmont engineering is the result of practical knowledge and broad experience. It also explains why Fairmont improvements are usually capable of easy application to units already in the field.

Fairmont Railway Motors, Inc., Fairmont, Minnesota.

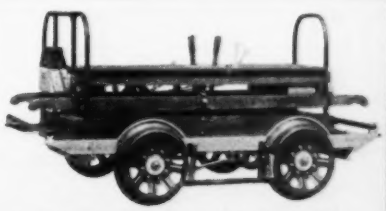
Inspection Motor Cars . . . Section Motor Cars . . . B & B and Extra Gang Cars . . . Gas-Electric Ditchers . . . Shapers . . . Ballast Cleaners . . . Ballast Drainage Cars . . . Mowers . . . Weed Burners . . . Extinguisher Cars . . . Power Cars: Air, Electric, Paint Spray, Tie Tamping . . . Rail Coaches . . . Motor Car Engines . . . Push Cars and Trailers . . . Roller Axle Bearings . . . Wheels and Axles.



● M9 SERIES B—One Man Inspection Car



● 59 SERIES C—One Man Inspection Car

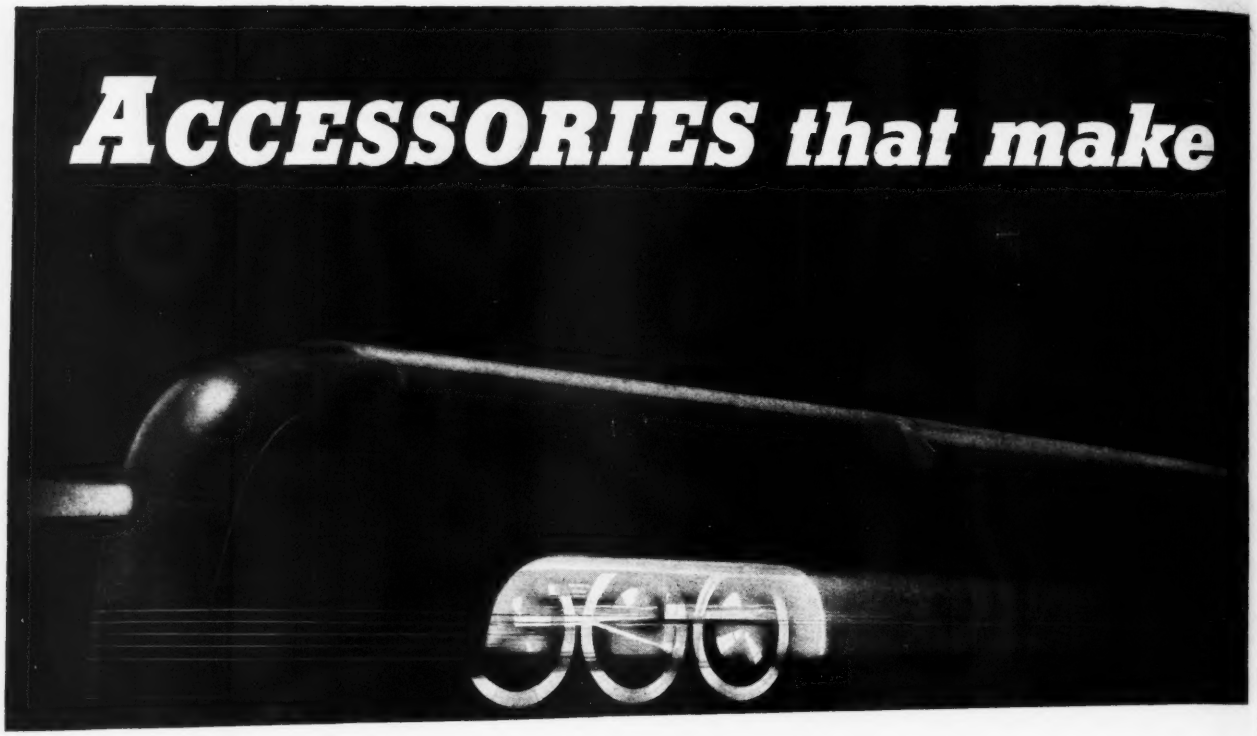


● M14 SERIES D—Light Section Car

ALL THE RAILWAY MOTOR CARS IN SERVICE TODAY

Fairmont

More than Half are Fairmonts



ACCESSORIES that make and more rugged for heavy traffic

PRESENT trends in railroading bring track maintenance much to the fore. The increasing use of high-speed light-weight equipment dictates new standards of smoothness. At the same time the drastic increase in freight-train speeds brings multiplied wear and tear.

The Bethlehem Track Accessories mentioned here are designed and built for these conditions. Adjustability is provided where this will aid in keeping track tuned up to streamline standards. Materials have been selected to provide the ultimate in strength, while in many cases resilience takes the sharp edge from impacts. Write for literature on these Bethlehem Track Accessories.

Bethlehem Gage Rod *stabilizes the rail at curves.* Bethlehem Gage Rods are the effective means of balancing the extra-severe thrusts at curves and switch points resulting from greater speeds.

These gage rods distribute the thrust over both rails at curves and hold the rails to gage.

The use of Bethlehem Gage Rods will be found to be an effective means of holding track in the precise alignment needed for fast light-weight equipment.

Bethlehem Spring Rail Brace *provides effective, resilient bracing at turnouts.* The Bethlehem Adjustable Spring Rail Brace securely anchors rails against side thrusts at turnouts. It yields slightly under impact, cushioning shocks, and recovers instantly. The adjustable feature simplifies the work of holding track accurately in position.

This rail brace is of two-piece construction—a combined switch plate and brace and a spring wedge. It is easily installed and readily adjusted in steps of $\frac{1}{16}$ in. by means of a pawl and slot arrangement, the only tool required being a hammer. The spring, besides providing the resilience to absorb impacts, maintains constant pressure on the rail, preventing vibration from loosening the wedge.

TO RAILWAY SUPPLY MANUFACTURERS

WILL YOUR PRODUCTS BE IN HIS PICTURE

Railway carloadings so far this year have exceeded those for the corresponding period of 1935 by 12 per cent. In July they were 27 per cent larger.

Gross operating revenues for the first six months were 14 per cent larger than for the same period last year. In July they were 27 per cent larger.

Net railway operating income for the first half year increased 22 per cent. In July it was more than 125 per cent larger.

Expenditures for maintenance of way in the first six months were $216,726,547 or 18 per cent greater than in the first half of 1935. *And the most significant feature of all of these figures is the fact that the rate of increase is rising.*

Increased expenditures mean increased buying of materials and equipment—half of all maintenance of way expenditures go to manufacturers. An already large market is expanding at the rate of more than $100,000 a day over last year.

Yet the needs of faster, heavier traffic and six years of restricted maintenance are so great that, with even the most optimistic outlook, there will not be money enough to meet all the needs. The problem confronting maintenance officers is one of selection.

Are you insuring consideration of your products by presenting to these maintenance officers month after month, through the magazine which they read first of all, the story of your products and the economies they will effect?

Are you taking the steps necessary to insure that your products will be in the picture which every maintenance officer —local and system—is now drawing as his program for 1937?

RAILWAY ENGINEERING AND MAINTENANCE IS READ BY MAINTENANCE OFFICERS OF ALL RANKS

SAFE Right-of-Way is *fenced* Right-of-Way

THE modern tendency toward increasing speed requires, more than ever before, an added measure of safety. Stock claims, injuries, and loss of life can be reduced and eliminated by proper fencing of the right-of-way.

The most economical right-of-way protection is offered by American Railroad Fence and Banner Steel Posts. The use of National Expanding Anchor End and Corner Posts (dirt set) will give you sturdy, economical, long-lived fencing which meets the specifications of the American Railway Engineering Association.

Further protection against costly claims will result from the use of strong fence properly placed in yards; around shops and buildings.

American Railroad Fence is made from rust resisting Copper Bearing Steel with an even coating of galvanizing as a full measure of protection against time and weather. The fence is made stronger and longer lasting by the famous American Hinge Joint which has the flexibility necessary to resist the weight and pressure of live stock.

We will be glad to talk over your fencing problems with you and to discuss further how costly claims can be reduced. Further information will be mailed to you on request.

AMERICAN RAILROAD FENCE *and* BANNER STEEL POSTS

AMERICAN STEEL & WIRE COMPANY, *Chicago - New York*
COLUMBIA STEEL COMPANY, *San Francisco*
TENNESSEE COAL, IRON & RAILROAD COMPANY, *Birmingham*
United States Steel Products Company, New York, *Export Distributors*

UNITED STATES STEEL

DON'T GRUMBLE ABOUT RISING PRICES

Stop them

During last two years... Rent up 15%... Food up 37%... Clothes up 22%—WHY?

Why do prices go up?

Here's one reason everybody can understand. Taxes are added into your rent. They're a big slice of your gas and electric bill. Gasoline averages 40% taxes. 53 taxes go into a loaf of bread. Everything you buy is a tax collector. Therefore prices go up when taxes go up.

Government spending now equals almost one-third of our national income!

Many government expenses are worthwhile. But probably a third of what national, state and local governments spend is wasted. That's five billion dollars, $166.00 for each family in America. If we don't *do something,* where will the waste stop? Ten billions? Twenty billions?

Don't blame the landlord and the grocer for the high cost of living. It's your own fault. Only you can stop government waste and promote economical, efficient government. This is how to do it; *take these two steps now:*

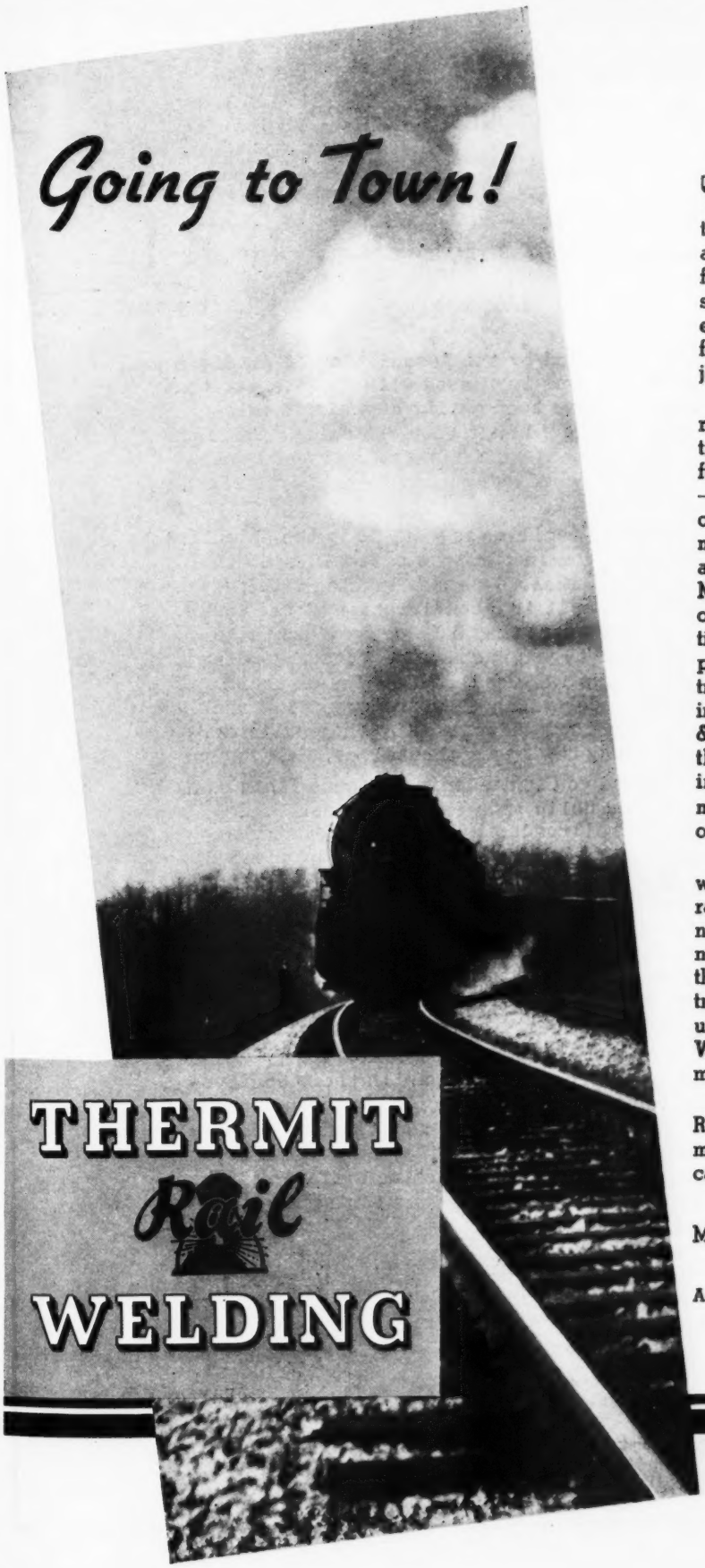
1. Make this resolution: "I will support no candidate who cannot prove that he has used all his influence to reduce government expenditures."
2. Write three letters. One to your Mayor, or County Clerk, one to your Governor, one to the President. Say: *"I want the cost of government reduced,"* and sign your name.

There are forty millions of us, working to pay for local, state and federal government. It's up to us to insist that the government watch its expenses as carefully as we do ours. After all, it's our money the tax wasters are spending.

DO YOUR PART TO BRING BACK ECONOMY IN GOVERNMENT

Register . . . Vote . . . Replace the wasters with lawmakers who will SAVE public money.

Space for this message is provided by *Railway Engineering and Maintenance*
because of a firm conviction that a reduced cost of government is vital to the interests of all its readers.



THERMIT Rail Welding is making rapid progress. Interest in continuous rails is growing by leaps and bounds. Important railroads are fast becoming convinced both of the savings to be gained through the elimination of rail joints and of the feasibility of welding rails into long jointless stretches.

This year, four more roads join the ranks of the pioneers in Thermit welded track: the Erie Railroad, with a 5300 ft. stretch in a tunnel at Otisville, N.Y. —the Northern Pacific, with continuous rails in two tunnels, each approximately 4000 ft. long, at Livingston and at Elliston, Montana—the Chicago, Milwaukee & St. Paul, with a half mile of welded track at the Milwaukee station—the New York Rapid Transit Corporation, with a half mile of double track in an open cut on a subway line in Brooklyn. In addition, the Delaware & Hudson, continuing the work started three years ago, has put in a fifth installation near Comstock, N. Y., making a total of nearly twelve miles of welded rails installed by this road.

These installations are pointing the way to enormous savings. Long welded rails have no gaps for wheels to pound; no rail ends to batter. Joint maintenance is banished because the joints themselves are eliminated. Frequent track lining and surfacing become unnecessary. Rail life is increased. Wear and tear on rolling stock and motive power are reduced.

It will pay you to investigate Thermit Rail Welding. Write now for full information. Or, ask to have a representative call and give you the complete story.

METAL & THERMIT CORPORATION
120 BROADWAY, NEW YORK

ALBANY • CHICAGO • PITTSBURGH
SO. SAN FRANCISCO • TORONTO

No. 93 of a series

Railway
Engineering and Maintenance

SIMMONS-BOARDMAN PUBLISHING COMPANY

105 WEST ADAMS ST.
CHICAGO, ILL.

Subject: FIVE LONG YEARS

August 27, 1936

Dear Reader:

In reading a circular issued by the Association of American Railroads a few days ago, I was impressed with a statement that "The railroads of America have been guilty of a sin of omission—they haven't told the world what they are doing. To do the job of remaking popular understanding of the railroads challenges the energies of every officer and every employee of the country."

Does this statement sound familiar to you? It is the objective which we have held before you in our lead editorials month after month since February, 1931. We are delighted with this statement of the A.A.R., for it is a confirmation of the work which we have been doing for more than 5 1-2 years. In these editorials we have brought to you each month facts regarding the indispensability of the railroads, the value of their service, the handicaps under which they are operating and similar topics that are seldom understood by the public or, for that matter, by railway employees themselves.

Repeatedly we have urged you to disseminate these facts as a means of acquainting the public with the full measure of service rendered by the railroads, in the belief that when they knew the facts they would insist upon fair treatment for the railways. The fact that many of you have used this information constructively is indicated by the numerous letters that we have received. Likewise, in response to the questionnaire which I sent some of you recently and to which I referred last month, 95 per cent of those of you who replied advised that you found these editorials helpful and desired their continuance.

We are delighted that the railroads are collectively undertaking the task of acquainting the public with their achievements for it vindicates the policy which we have been pursuing for these 5 1-2 years. With you, we shall watch their activities with interest. In the meantime, we shall continue to bring to you monthly, information which we believe will be helpful to you, as maintenance men, in your contacts with other employees and the public.

Yours sincerely,

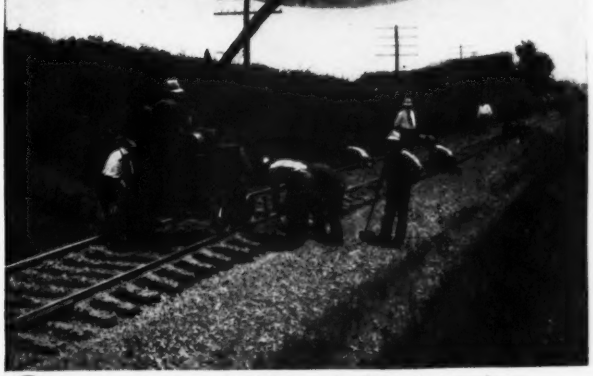
Elmer T. Howson

ETH:JC

Editor

MEMBERS: AUDIT BUREAU OF CIRCULATIONS AND ASSOCIATED BUSINESS PAPERS, INC.

Ballasting with Speed and Accuracy..



Note the lift being made. The main tamping gang has been outdistanced by the Jack.

Making a six inch raise in gravel ballast. The spot board can be seen in the background.

Only ONE Nordberg Jack for an 80 man gang

For lifting track on ballasting and surfacing work, the Nordberg Power Jack is essential for rapid progress. Compare this with the old time hand methods. Just imagine the number of jack men that would be required for an 80 man gang. Here the Power Jack, its operator, and a few men tamping ties at the Jack are easily keeping ahead of the main tamping gang. It is doing the job faster, with **greater accuracy** and is an aid in reducing the cost of this work.

The Nordberg Line

POWER JACK
SPIKE PULLER
GRINDERS
ADZING MACHINE
POWER WRENCH
RAIL DRILL
TRACK SHIFTER

NORDBERG MFG. CO.
MILWAUKEE, WIS.

Railway Engineering and Maintenance

NAME REGISTERED U. S. PATENT OFFICE

September, 1936

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Railway Engineering and Maintenance

Loans

Can the Roads Repay Them?

"THE ROADS are borrowing so much money from the government that they will never be able to repay it and the government will have no alternative but to take them over. In other words, regardless of whether we favor it as a national policy, we are rapidly drifting over the brink of government ownership."

This sort of statement was circulated commonly a year or two ago. It originated most frequently among those who either longed for government ownership of our railways and saw this growing indebtedness as a means of attaining the desired end, or who viewed the future so pessimistically that they saw no other way out.

The R. F. C.

It is well to recall for a moment the fact that government entered the loaning field through the Reconstruction Finance Corporation because private channels for financing were inoperative. As a result, the RFC made loans to the railways to meet maturities and other needs; it also made loans to numerous other industries, including hundreds of banks. It was an agency created to meet the crisis through which we were passing.

So far as the railways were concerned, the RFC authorized loans to 73 railways, totaling $615,203,795, to July 1, 1936. Of this amount, however, only $506,133,239 was actually disbursed, the remainder of the fund being cancelled or not drawn on.

The P. W. A.

The Public Works Administration also made loans to the railways to finance the purchase of rails, new equipment and maintenance work, looking to increased employment. For this purpose, the railways borrowed a total of $200,529,500.

A third type of railway loan was financed through the Railroad Credit Corporation, an agency set up by the railways themselves to collect into a pool the income from the emergency increase in freight rates authorized by the Interstate Commerce Commission in 1931, for the purpose of aiding the weaker roads in meeting fixed interest obligations. From this fund a total of $73,691,368 was loaned.

From these three funds a total of $780,354,107 was borrowed by needy carriers, a formidable sum and yet not hopelessly large.

So much for the borrowing. What of the progress in repayment?

Of the $506,133,239 loaned by the RFC, 50 of the railways have already made repayments aggregating $155,292,399. Of this amount, $64,325,436 was repaid in the first seven months of this year, or more than was repaid in any of the four preceding calendar years. As a result, the RFC loans to the railways had been reduced to $350,840,840 on August 1.

Likewise, the railways have repaid to the PWA $23,643,000, leaving $176,886,500 outstanding. Furthermore, collateral securing $91,741,000 of these outstanding loans has recently been sold to the investing public, reducing the amount of these PWA loans still in the hands of government agencies to $85,145,000.

Of the loans made by the Railroad Credit Corporation, a total of $46,331,074 or 63 per cent of the total amount loaned had been repaid on August 31, leaving a total of $27,360,294 still outstanding.

30 Per Cent Repaid

In brief, with the relatively limited degree of recovery which the railways have enjoyed to date, and with traffic still more than 25 per cent below the 1925-29 level, the roads have already repaid approximately $225,000,000, or nearly 30 per cent of their total indebtedness to these agencies. Furthermore, with the sale to the public of the collateral referred to above, the indebtedness of the railways to the government has been reduced to less than $450,000,000.

It is interesting in this connection to note that payments towards the reduction of indebtedness to the RFC include $15,600,000 by the New York Central, $18,200,000 by the Nickel Plate, $28,900,000 by the Pennsylvania, $18,672,250 by the Cotton Belt, $22,000,000 by the Southern Pacific, and $12,150,477 by the B. & O. Given another year of favorable earnings, it is expected that even greater progress will be made in reducing this indebtedness.

Nor is this record unique, for if one will revert to the period of federal control and to the years immediately following, he will recall that the government loaned the railways a total of $1,116,000,000, of which they repaid all but $33,600,000. Since the railways paid the government interest on these loans at the rate of six per cent, or a total of $180,000,000, while the government borrowed this amount at a cost of about four per cent, or $120,000,000, it can be seen that it still shows a profit of some $26,000,000 after writing off all these unpaid loans, some of which are still being collected.

The record which the railways made in the repayment

of these loans 15 years ago and the record which they are now making in reducing their present indebtedness to the government provide a conclusive answer to the fears (or hopes) of those whose forebodings were so prominent a year ago. This record deserves wide dissemination among the public as another evidence of the stability of the railway industry. It is a record to which every railroad employee can "point with pride."

Low Water

An Excellent Time to Inspect Bridge Substructures

THE occurrence in this country in recent years of a number of bridge failures that have been directly traceable to faulty foundation conditions has impressed responsible railway officers with the fact that periodic thorough inspections of such foundations, particularly in old structures, is highly desirable. Yet adequate inspection of those portions of bridge substructures that are normally submerged constitutes a problem that has not yet been solved in a completely satisfactory manner. Probably the most reliable method of making inspections of submerged structures without going to the expense of building a cofferdam is that which involves the use of a diver. However, this method has not always proved entirely satisfactory and it is employed only to a limited extent in this country.

This year, however, owing to the widespread drouth, stream levels at many points throughout the country, particularly in the middle west, have receded to record lows and in so doing have exposed portions of piers and abutments that heretofore have been more or less permanently submerged. In such instances opportunity is afforded for a thorough inspection of those portions of the structures that have been exposed by the unprecedented lowering of the water level. That the situation has already been recognized in some quarters is shown by the fact that representatives of the bridge departments of a number of roads with structures across the Missouri and Mississippi rivers have recently made special inspections of the foundations of these structures.

The opportunity would seem to be particularly advantageous in the case of stone masonry where the condition of the mortar and the degree to which the blocks have been loosened or have become displaced in that part of the structure that is still covered by water may be determined by an examination of the exposed portions. In making such an inspection of the piers in its bridge across the Mississippi river one railroad found conditions were such as to demand early attention and is making plans to carry out extensive repairs in the near future.

In spite of the fact that rains have fallen recently in some areas, stream levels are still close to their low levels for the season so that the type of inspections under discussion may still be made. In any event, excessively dry years, such as has been experienced in 1936, are certain to occur from time to time and bridge department officers should not lose sight of the fact that excellent opportunities are afforded in such years for the inspection of bridge substructures.

Courtesy

Help to Make Passenger Trains Popular

RAILWAY transportation is undergoing a rebirth. Stimulated by the public response to shorter schedules, lower fares, air-conditioning, etc., railway managements are bending their efforts to increase the attractiveness of passenger travel from all angles. One road has instituted a campaign for more attractive appearance of its passenger trainmen—keeping a close check on the neatness of their uniforms, shoes, etc. But these and other measures are but incidental to the fostering of courtesy on the part of all employees who come in contact with the traveling public. While this is a matter primarily concerning the demeanor of trainmen and station employees and the officers who supervise their work, it is something that every employee or officer, regardless of what his rank or duties may be, should keep in mind.

While physical comfort, speed, frequency of service and relative passenger fares are all contributary factors in determining the popularity of train travel, the human element is no less important. Courtesy in answering questions, a display of interest in the welfare of the passengers, an effort to provide adequate seating, especially for women accompanied by children, all make for the enjoyment of the journey and will insure good will.

Maintenance of way men on trains should not only be on the alert to detect and call attention to discourtesy or neglect on the part of trainmen or inconsiderate conduct on the part of other "dead-heading" employees, but should also do what they can personally to increase the passengers' comfort. Passengers should be made to feel that their patronage is appreciated.

Pipe Lines

Records of Underground Facilities Should Be Kept

MOST additions and betterments to railway properties are the result of careful planning. Yet, when considered from the standpoint of the eventual result, the facilities at a given terminal or important station represents the composite effect of many improvements carried out at various times during the life of the property. So far as the tracks, bridges, buildings and other facilities above ground are concerned, no great harm is done if the original plans have been lost or destroyed, because they can be replaced if need be by field surveys. But this is not true of water pipes, electrical conduits, sanitary sewers or drainage systems, for in the absence of maps or location diagrams, it is necessary to rely on the memory of some "old timer" whose duties have required him to retain a knowledge of these buried facilities.

It is true that many of these men, water service foremen, for example, have an almost uncanny knowledge of the location of pipe lines, valves, catch basins, manholes, etc., but some men are not so well informed and all men must leave the service eventually, so unless proper steps are taken, much that these men know will be lost when they pass out of the picture. The situation during the

last four or five years has been aggravated by the temporary abandonment of facilities.

All this points to the need of complete diagrammatic records of under-ground facilities. Like all matters involving the expenditures of time and money, that have no direct bearing on the business of providing safe and expeditious railway transportation for the least immediate outlay, the keeping of such records up to date has been necessarily classified as of secondary importance. In the press of more urgent work such tasks are easily overlooked until the essential information is lost. They should not be put off until it is too late.

It Did Not Stop

Depression Was No Bar to Progress

THE "nineteen twenties" are frequently referred to as the period of intensive improvement of railway tracks and structures. The decade is also commonly associated with the development and introduction of power tools and equipment as well as improved track accessories. However, it is to be questioned whether the advance made in the use of mechanical appliances or better materials in the period prior to 1930 was any more pronounced than it has been since that year. The profound decline in maintenance of way expenditures that followed the advent of the depression has overshadowed the concurrent development work to such an extent that few realize how much has been accomplished during this trying period. Another reason is to be found in the fact that as the depression years slip by, one is inclined to ascribe to predepression years developments that have taken place since the hard times came. What are the facts?

Among the most noteworthy accomplishments of the nineteen thirties was the perfection and general application of power grinders. True, a few car-mounted grinders were in use as early as 1926, but the demand for them was confined largely to rail-end welding with the electric arc. The widespread application of grinders to oxy-acetylene welding and the introduction of a variety of effective grinders designed especially for track work have occurred entirely within the present decade.

The case of the power adzer is somewhat different, as this device was introduced during what we now term the period of prosperity. But its general adoption as a necessary accessory to rail renewals was definitely a "hard times" development. A parallel experience is to be found in the case of the snow melters, several types of which had been on the market for years, but they did not become an important factor in fighting snow on the railroads until about 1931 or 1932.

However, progress has not been confined to the perfection and use of entirely novel appliances, for almost as much could be said concerning the improvement of appliances already in use, or the introduction of equipment to do in a different way work that was already being done mechanically. Under these classifications may be mentioned light-weight section motor cars, the two-stage tamper compressor, a spike puller, the impact wrench, and many others.

Other marks of progress during the depression years are the introduction and application of the several systems of track fastenings that are designed to provide a more rigid track construction, heat-treated steel for trackwork, the butt-welding of rail in continuous stretches and heat-treatment as applied to the running surface of rails at the joints. All these examples of improvements of materials, appliances and methods that occurred during a period when the railroads were in sore straits for funds to carry on their operations, are evidence of the resourcefulness of railway men and the initiative and courage of the manufacturers. But even more important—they testify to the willingness of the railway managements to appropriate money for any appliances or materials that can demonstrate their economic value.

Labor Costs

How Much Lower Will They Go?

OWING to the widespread use of mechanical equipment and improved methods, practices and organization, unit costs of performing various types of track work are now substantially below what they were a decade or more ago. This is particularly true of such operations as surfacing and the laying of rail out-of-face, which activities offered particularly fertile fields for the application of mechanical equipment and the introduction of mass production methods. Thus one railroad reported a few years ago that it had reduced the cost of laying rail over a 10-year period from $5 to $1.50 a ton.

In recent years, however, the curve of unit costs on some roads has shown a tendency to level off, following the precipitous decline of a few years ago, and one may be inclined to wonder if the railroads may not finally face a limit in the reduction of the unit costs in maintenance of way work, at least to the extent that future reductions will be relatively small. While the facts may appear to constitute some justification for such a conclusion, an instance arises occasionally which demonstrates that few railroads have yet exploited all opportunities for effecting reductions in maintenance costs.

For instance, it is recalled that one railroad, in an entirely unsuspected manner and quite by chance, was enabled to make a sizeable reduction in the labor costs on a large scale rail-end welding project. The original plan was to utilize four fully equipped and entirely independent welding crews. When it was discovered, however, that camp car equipment sufficient for only two gangs was available, it was decided to consolidate the four gangs into two, employing the same number of welders. When the reorganization of the gangs on this basis had been completed it was found that the equivalent of 26 laborers had been eliminated without in any way impairing the efficiency of the gangs.

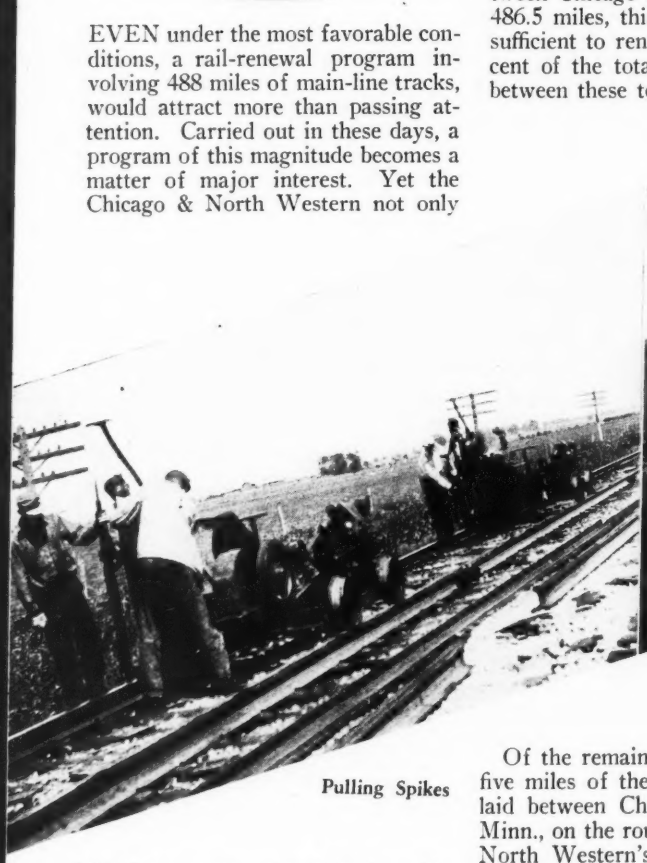
In citing this instance it is not meant to imply that savings in labor costs may be effected through the wholesale consolidation of gangs. Rather it is used merely to illustrate the fact that few maintenance costs are yet down to a "rock-bottom" basis and, further, that opportunities for making savings sometimes arise where they are least expected.

Laying 282 Miles

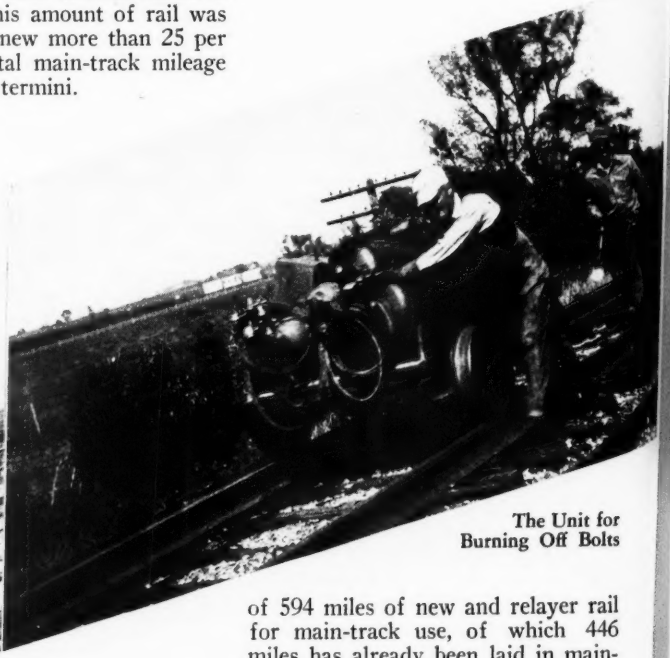
Ranking as one of the largest rail programs in recent years, the Chicago & North Western is laying 562 miles of new and released rail in its main-line tracks this year. One of the striking features of the program is that more than one-fourth of the main-track mileage between Chicago and Omaha was laid with new 112-lb. rail. Equally striking, 282 miles of new rail was laid by four gangs in 66 working days.

EVEN under the most favorable conditions, a rail-renewal program involving 488 miles of main-line tracks, would attract more than passing attention. Carried out in these days, a program of this magnitude becomes a matter of major interest. Yet the Chicago & North Western not only laid this amount of rail in its main lines this year, but it also has 100 miles of released rail for use in less important lines and a considerable amount of released rail in yard tracks and sidings. The magnitude of this program becomes still more striking when it is considered that this road had already laid considerable mileages of heavy rail in both 1934 and 1935.

Another striking fact connected with this program is that 250 miles of 112-lb. rail was laid on the line between Chicago and Council Bluffs, Iowa, over which operate the four streamliners which run between Chicago and Denver, Colo., Portland, Ore., San Francisco, Calif., and Los Angeles, respectively. Since this is a double-track line and the distance between Chicago and Council Bluffs is 486.5 miles, this amount of rail was sufficient to renew more than 25 per cent of the total main-track mileage between these termini.



Pulling Spikes



The Unit for Burning Off Bolts

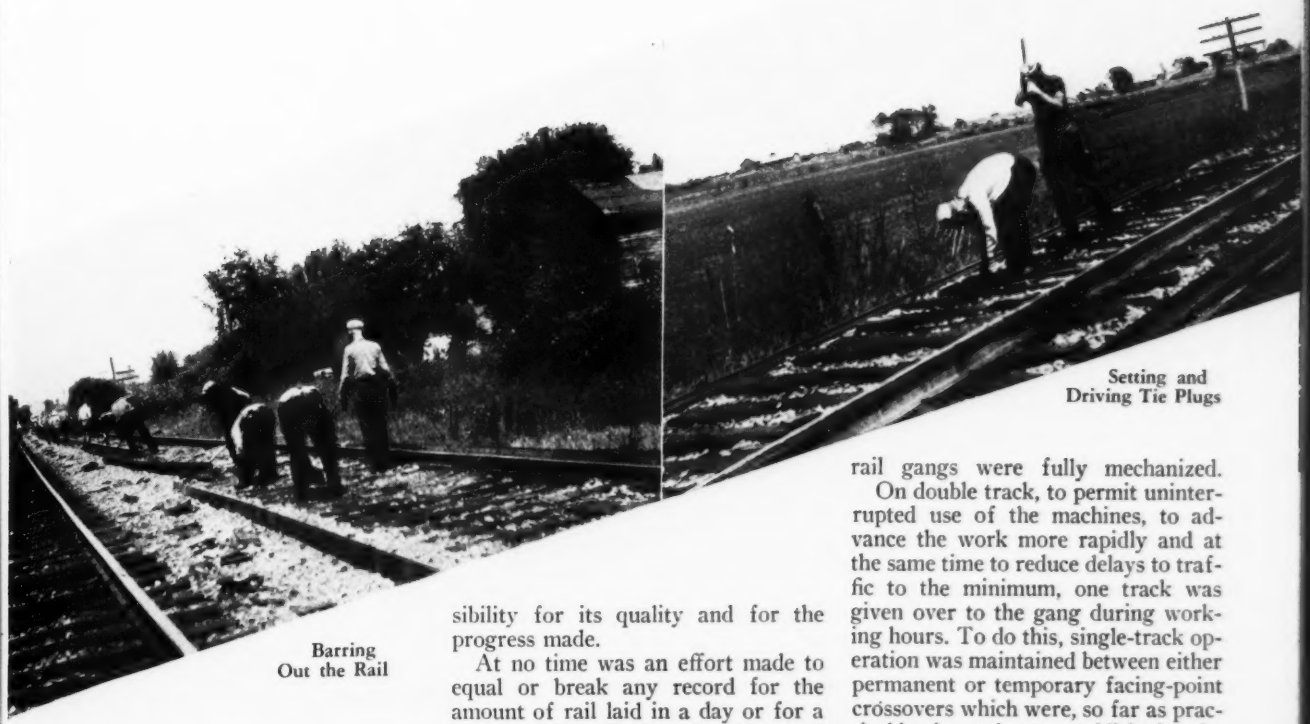
Of the remainder of the new rail, five miles of the 112-lb. section was laid between Chicago and St. Paul, Minn., on the route of the "400," the North Western's high-speed steam train between these cities; 27 miles of 100-lb. rail was laid between Chicago and Janesville, Wis., on an alternate line to St. Paul; and six miles in scattered locations.

All of the rail released in the laying of this 288 track miles of new rail was 100-lb., of which 206 miles was suitable for use on secondary main lines, while the remaining 82 miles was classified for branch lines, sidings and yards and as scrap. Again, in laying the 206 miles of 100-lb. rail released from the primary main lines, approximately 100 miles of lighter rail was released for use on branch lines, and the remaining 100 miles will be utilized in yards or sidings, or classified as scrap. This gives a total of 594 miles of new and relayer rail for main-track use, of which 446 miles has already been laid in main-line tracks.

Another feature of more than ordinary interest is that 282 miles of the new rail, except a small amount through an interlocking plant, was laid between March 25 and June 22, a total of 76 working days. Yet, since the four gangs engaged on the work started on various dates up to April 20, the actual time worked totaled only 264 days or an average of 66 days for each gang, including all delays arising from weather, traffic, moving camps, etc. This gives an average of 4.3 miles of rail laid a day, or 1.1 miles for each gang.

As a matter of fact, however, the actual progress of the individual gangs ranged from ¾ mile a day in

# of Rail in 66 Days



Setting and Driving Tie Plugs

Barring Out the Rail

the suburban territory near Chicago, where there is an almost continuous succession of towns, switches and street crossings, to more than two miles a day out in the country where few obstructions were encountered. In several instances, in some of the larger towns where crossings and switches were especially numerous, the progress dropped to less than ½ mile a day. In general, however, outside of towns the gangs held to a consistent average of 1.4 to 1.5 miles of completed track a day.

Although the gangs engaged on this work were especially organized and equipped as system gangs and were moved from one division to another under the direction of the engineer maintenance, as required by the rail program for the year, while on any division they worked under the direct supervision of and reported to the roadmaster. Thus, as on other roads which follow the practice of employing system gangs, the roadmaster is given full authority to supervise the work and, logically, assumes responsibility for its quality and for the progress made.

At no time was an effort made to equal or break any record for the amount of rail laid in a day or for a longer period. Rather, the officers of this road are convinced that better results will be obtained in quality of work and overall economy, as well as in the ultimate time consumed in caring for the rail, by maintaining steady day-by-day progress of orderly operation.

Following immediately behind each of the rail gangs, a ballasting gang renewed ties, applied ballast and surfaced the new rail. So far as practicable, the ballasting gangs maintained their position relative to the renewal of the rail so as to remain within the zone of single track. This was not always possible, however, since the rail was laid in stretches ranging from 2 to 40 miles in length, so that on some of the shorter stretches, by the time the ballasting gang was able to start, the rail gang had finished and was moving to the next job.

It is a policy of long standing on the North Western to use power machines and tools wherever this can be done effectively and economically. In pursuance of this policy all of the rail gangs were fully mechanized.

On double track, to permit uninterrupted use of the machines, to advance the work more rapidly and at the same time to reduce delays to traffic to the minimum, one track was given over to the gang during working hours. To do this, single-track operation was maintained between either permanent or temporary facing-point crossovers which were, so far as practicable, located at established telegraph offices to avoid the necessity for special operators.

As a further measure to reduce the possibility of delays to traffic, a dispatcher, working in conjunction with the district dispatcher, was assigned to supervise the movement of trains over the single track. By careful planning on the part of the local and district dispatchers, during the entire period while the rail was being laid no trains were delayed as a result of the work of any of the gangs.

Where high-speed trains of the stream-line type are being operated, the schedules are usually so "tight" that avoidable delays or even reductions in speed cannot be tolerated. Fortunately, in this case, all of the westbound streamliners are operated during the night between Chicago and Omaha. Likewise, west of the Mississippi river, the eastbound trains of this type are scheduled outside of working hours, although for some distance approaching Chicago the schedules encroached slightly on the regular working period. For this reason,

to avoid diverting these trains, when laying rail on the eastbound track in this territory, the starting time was set back enough to permit them to operate at full speed over their regular track.

Because of the number of power machines and tools involved, and of the importance of maintaining them constantly in first-class operating condition, the supervisor of work equipment assigned an experienced maintainer to each gang permanently. In this way every machine was given a thorough inspection daily, and small defects were detected in time to avoid the possibility of the machine going out of service and the consequent delay to the work.

The machine operators were also trained men who were familiar with the equipment in their charge, who were able to assist in making repairs or changing work parts. As a result of this arrangement, parts were obtained sufficiently in advance of the time they were needed to avoid breakdowns, and at the same time, the stock of repair parts was reduced to the practical minimum.

Again, the North Western has found through experience that both the quality and the quantity of work produced by a gang depend in large measure on the character and the amount of supervision that is provided, and that ample supervision usually results in decreased cost. This is particularly true for large gangs, such as those under discussion, where the smoothness with which the individual units function determines the overall performance of the gang as a whole. For this reason a general foreman and six foremen and assistant foremen were assigned to insure intensive supervision of every operation of the several units of which the gangs were composed.

Since all of the gangs were organized on the same lines and were similarly equipped, the methods followed were substantially alike. For this reason, a description of the work of one gang will apply with equal force to the others, except for the fact that this discussion will apply to work on the double-track line between Chicago and Omaha, and does not refer to single track where it was necessary to lay the rail under traffic.

Well in advance of the arrival of the gang on any stretch of track, the rail and turnout material had already been unloaded. On the other hand, the small material for each day's work was distributed daily ahead of the gang by the work train, which then fell back to the rear to pick up the released rail and other second-hand and scrap material.

In a few instances where two gangs were working in close proximity, it was possible to serve both with a single work train. In others, a single work train was able to serve the rail gang and unload ties.

A short distance ahead of the first unit, two men distributed tie plugs and two other men placed the new tie plates in the center of the track, while one man removed anti-creepers and another clipped bond wires. Following this advance group, two Nordberg spike pullers, each with three men, pulled the spikes. Immediately behind the spike pullers, a Nordberg bolting machine operated by two men stripped the nuts from the bolts.

As is usual with old rail, some of the nuts were frozen and others had rounded corners. To avoid loss of time these were burned off by one torchman and a helper with an oxy-acetylene cutting torch. Likewise, some of the spikes in the joints could not be reached by the spike-pulling machines because of the bolts, so that it was necessary for two men with mauls and two men with clawbars to follow the torchmen to pull these spikes and others that were throatcut or otherwise defective. One man then knocked out the bolts and removed the joint bars. Immediately thereafter, two men with lining bars barred out the old rails individually.

As soon as the old rail was thrown out, the preparation of the track to receive the new rail was started. First, one man removed the tie plates and three men picked up and placed on the shoulder, where they would be out of the way of the following workmen, all of the old spikes, bolts, nuts, spring washers, tie plates, joints and anti-creepers, but made no separation between usable material and scrap. Next, two men, one with a punch and the other with a maul, drove down all spike stubs to prevent damage to the adzing heads. Three men then set the tie plugs and three more men drove them down. It is noteworthy that special care was exercised to insure that all plugs were driven to full depth. From 7 to 14 men, depending on the kind of ballast and the height to which the cribs were filled, then leveled the ballast in the cribs below the adzing level and swept the tops of the ties over the adzing aera.

Adzing the Ties

Setting the Tie Plates for New Rails

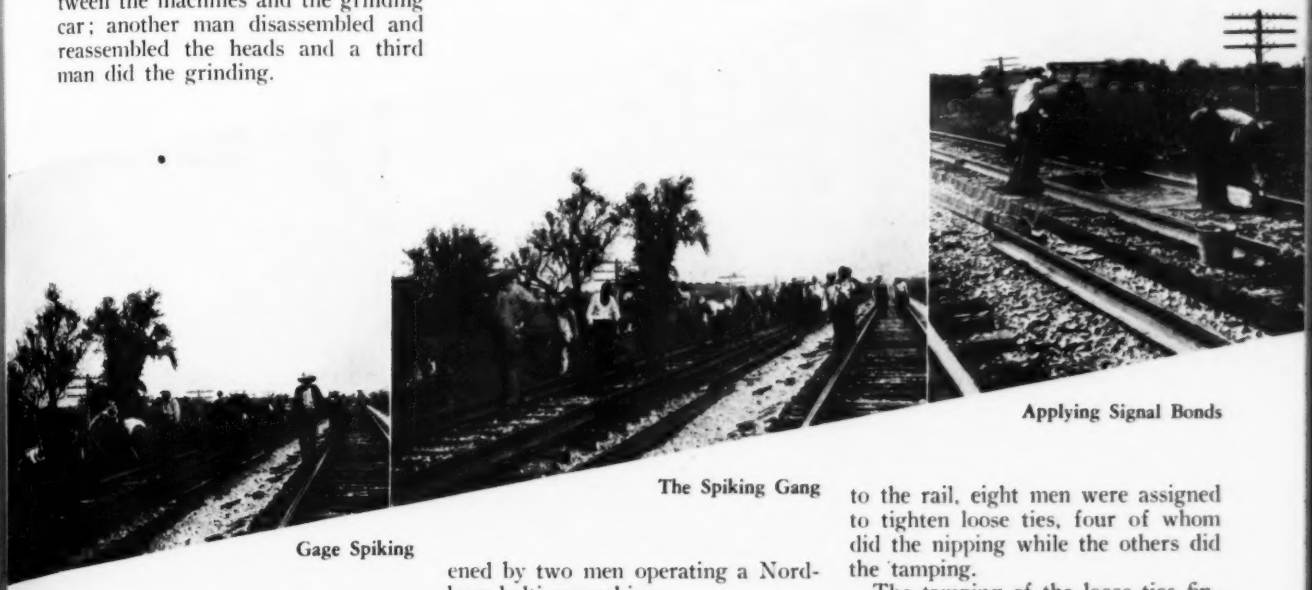
Setting In the Rail

Adzing Procedure

Following this phase of the preparatory work, a battery of three Nordberg adzing machines, each requiring two men, then adzed the ties. The first machine made a rough preliminary cut to remove all loose, splintered and decayed wood; the second followed to make the major cut into the sound wood; and the third made the finishing cut. In this way, each

of the machines was used on every tie. Experience has shown that the adzing can be done more rapidly by following this system and that a smoother seat for the tie plate is obtained than by requiring every machine to make a full cut on alternate ties.

Despite the best of care adzer bits dull rapidly, and experience has shown that a smooth job of adzing cannot be expected unless the bits are kept well sharpened. Therefore, to insure a constant supply of sharp bits, a push car, accompanied by three men, carrying grinder equipment and facilities for removing and replacing the bits, was attached to the adzing unit. One man carried the adzer heads between the machines and the grinding car; another man disassembled and reassembled the heads and a third man did the grinding.



Gage Spiking

The Spiking Gang

Applying Signal Bonds

Immediately behind the adzing, three men with pails and brushes gave the adzed surfaces a thorough coating of Carbolineum. Three men then placed the new tie plates, thus completing the preparation for the laying of the new rail.

Laying the Rail

The rail was laid with a Burro crane, requiring the services of seven men, including the crane operator and an assistant foreman, the latter also placing the expansion shims. The forward man of this group turned the rails up workway to facilitate the application of the tongs. One man with a thermometer recorded the temperature of the rail and also removed the expansion shims. The remaining three men included a tongman and two men to guide the rail into place.

Two push cars were attached to and were pulled along by the rail crane. The first contained a supply of drinking water in barrels and a reserve supply of hand tools. The second was employed for the purpose of distributing bolts, spikes, spring washers and anti-creepers, the supply being replenished constantly from the stock unloaded earlier by the work train. Two men loaded and opened the kegs, boxes and bags containing these materials, while one man distributed the spikes, another man handled the bolts and spring washers and a third distributed anti-creepers.

As soon as the rail crane and its trailers had passed, one man oiled the rail ends and four men applied the rail joints, which were of the symmetrical type, and started the nuts on the bolts. The bolts were then tightened by two men operating a Nordberg bolting machine.

The next operation was that of gaging and spiking, which was done entirely by hand. The gaging crew was made up of four sets of three men each. They were followed by 26 to 28 spikers, this number varying somewhat from time to time, particularly when passing through towns where progress was slowed down somewhat. After the spiking was completed, one man with a track wrench tested the bolts to insure that they had been properly tightened. Three men then applied the new anti-creepers.

Even in track that is maintained to a high standard, a certain number of ties will be found to be loose unless the track has been surfaced very recently. Again, some ties will necessarily be adzed deeper than others, owing to the wide range in condition between those that are practically new and those that are near or at the end of their service life. Furthermore, where a part of the ties were unplated these ties will be high when the new tie plates are inserted out of face. For these reasons, new rail will not be given uniform support unless specific provision is made to do so.

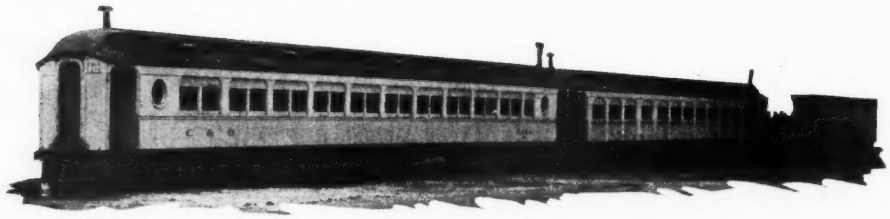
If track has been well maintained, however, this does not mean that the rail will be badly out of surface, but that a few ties here and there will need "tightening." It also goes without saying that track over which trains are being operated at speeds higher than 80 miles an hour, as is the case on the line between Chicago and Omaha, is being kept in good surface. However, to insure that every tie will give the proper support to the rail, eight men were assigned to tighten loose ties, four of whom did the nipping while the others did the tamping.

The tamping of the loose ties finished the actual laying of the rail, leaving only two further operations to complete the work, that is, the cleaning up of the old rail and other material, and the application of the signal bonds. In salvaging the old material, four to six men were assigned to sort it and to pile the usable material and scrap separately where they could be picked up quickly by the work train, the operation of which has been mentioned. In addition, one man with a push car picked up all tools dropped by the units in advance.

Finally, a unit composed of two welders and two helpers applied the welded signal bonds and bootleg connections, so that within a few minutes after closure was made for the day, the automatic signals were restored to full operation. In addition to the welders, a signal foreman who belongs to this unit supervised the application of the insulated joints.

It will be observed from the foregoing that the gang, including 16 to

(Continued on page 547)



Two of the New Passenger Equipment Cars

High

Made From Old

During the last two years the C. & O. has retired from passenger train service 114 coaches, parlor cars and express and baggage cars, which were converted into camp cars for use by its construction and maintenance-of-way field forces. Three general types of cars were provided—large-gang sleeping cars, large-gang office-dining-kitchen cars, and small-gang combination sleeping, kitchen and dining cars. The lay-out and special features of these different types of cars are described in this article.

DURING the last two years, the Chesapeake & Ohio has replaced approximately 300 box-car type camp cars used by its maintenance of way and construction forces, with 114 well-laid-out and equipped camp cars converted from retired passenger train service equipment. As a result, the road now has among the 615 camp cars on its lines, some of the best quarters that it has ever provided its field forces.

In providing the new cars, no attempt was made to make them unusually attractive, but the object was to make them airy, light, sanitary and comfortable for the men, as well as thoroughly practicable for gangs of the various sizes to which they would be assigned. So far as interior furnishings are concerned, the new cars are little different from up-to-date camp car equipment provided by other roads, but the arrangement of interiors is particularly effective for the size of gangs to be housed, and reflects careful thought for the comfort, health and general well-being of the men.

This new camp car program originated with the retirement of old passenger train cars in the road's program for the improvement of passenger train service and equipment. The cars released for camp car service included 65 coaches, 11 parlor or parlor-buffet cars, 2 combination passenger and baggage cars, 17 express cars and 19 mail and express cars. All of these cars had wood bodies, either four or six-wheel trucks, and, of course, standard couplers and brake equipment suitable for operation in passenger service. Fifty-four of these cars had steel underframe, steel center sills or channel underframes, while 60 of them were of wooden underframe construction. The clear inside length of the coaches and parlor cars was 69 to 70 ft., and that of the mail and express cars ranged from 57 to 64 ft., while the inside length of the express cars was approximately 60 ft. 3 in., and of the combination passenger and baggage cars approximately 65 ft. 4 in. Practically all of the passenger-carrying cars were equipped with enclosed vestibules.

Three Types of Camp Cars

All of the cars released from passenger train service were converted into three general types of camp cars: Large-gang sleeping cars, with bunks for 20 men; dining cars with foreman's and cook's quarters, for use with large gangs; and combination sleeping and dining cars for gangs not exceeding 14 men. Altogether, a total of 47 of the large-gang sleeping cars, 28 of the office-kitchen-dining cars, and 39 of the combination small-gang cars were provided. The type of passenger train car had little to do with the type of camp car into which it was converted, except that all of the large-gang dining cars were converted from the parlor and parlor-buffet cars because of their large windows and more attractive interiors, which made them particularly suitable for the camp diners. The matter of windows, however, was not a controlling factor in assigning the cars to any one class of service because wherever windows were required in any of the car arrangements for proper light or ventilation, they were provided during the alteration work.

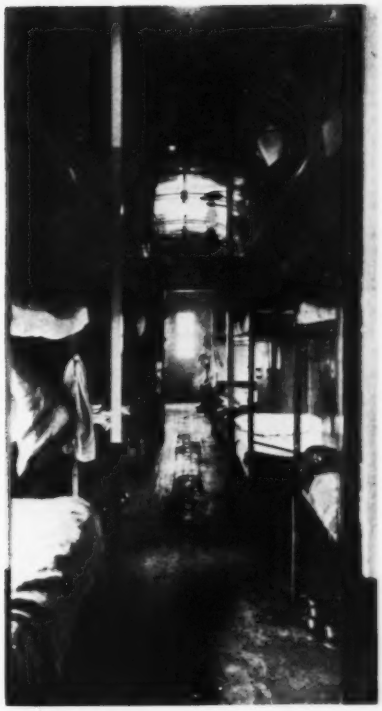
The new large-gang sleeping cars are divided by timber bulkheads into three main compartments, including a sleeping room occupying the center section, a locker and washroom at one end, and a lounge or recreation room at the other end. The sleeping compartments in these cars, which vary in length from about 26½ ft. to 33 ft., depending upon the length of the cars and the different window arrangements, are each furnished with 8 or 10 double-deck bunks, 4 or 5 on each side, with a passage or dressing aisle between them. All of the bunks have steel frames and are equipped with springs and mattresses, and, as a rule, each bunk is located directly alongside a window. There are no partitions between the individual bunks, so that there is a free circulation of air throughout the sleeping compartment as a whole.

The locker and washroom compartment varies in length from 20 ft. to 24 ft. in the different cars, and is provided with six wall-type wash basins, a 3-ft. by 3-ft. shower stall, and sixteen or twenty 18-in. by 21-in. steel lockers. This room also houses a caboose-type heating stove and a coal box, a 70-gal. overhead cold water tank and a 30-gal. overhead hot water tank, and, in addition, has two long dressing benches along the side walls.

The lounge compartment in this type of car varies generally from 12 ft. to 14 ft. in length, although in a few of the larger cars this room is as long as 21 ft. This area, which is used by the men as a general sitting

Class Camp Cars

Passenger Equipment



Looking Through the Sleeping Quarters in One of the Small-Gang Combination Cars

and recreation room outside of working hours, is equipped with a movable center table 3½ ft. square, a writing desk and six or more chairs. The room also houses a second caboose-type heating stove and coal box, which, with the stove at the other end of the car, keeps the car warm throughout in cold weather.

Dining Cars

The new dining cars provided for use in conjunction with the large-gang sleeping cars are divided into a dining room, a kitchen, a foreman's office, a commissary, and cook's sleeping quarters. The dining room, which in the different cars of this type varies in length from 19 ft. to 26 ft., is equipped with a long table, with benches or chairs, and a drinking water cooler. The kitchen, always at one end of the car, adjacent to the dining room, is generally from 15½ to 16 ft. long, and is equipped with a coal-burning cooking range, a sink and drainboard, a wall cupboard and table, a second working table and an icebox. Sometimes, to afford more room in the kitchen, the icebox is located in the dining compartment. The water supply in the kitchen is contained in a 26-gal. tank located directly above the sink, and also in a 50-gal. water barrel, with a faucet at the bottom, which rests on a platform along the opposite side wall.

The foreman's quarters in the large dining cars are located at the end opposite the kitchen, and include, in addition to a desk for the foreman's convenience in keeping records and in making out reports, a single bed or a double bunk, a washstand and two steel lockers. This area, which varies from 12½ to 13½ ft. in length in the different size cars, also houses a caboose-type heating stove, which, with the cooking range, keeps the car warm in cold weather.

The commissary and cook's quarters are partitioned areas located along one side of the car between the dining room and the foreman's office.

The Kitchens of the Large-Gang Dining Cars Provide Adequate Space and Facilities for Cooking for Large Groups of Men

The Foreman Has Comfortable Business-Living Quarters in the Large-Gang Office-Dining-Kitchen Cars

Interior of One of the Old Parlor Cars Converted Into a Large-Gang Dining-Kitchen Car

The size of the commissary varies from as little as 5½ ft. long in the shorter cars to 10 ft. in the larger cars, while the cook's quarters, which include a double bunk, a wash basin, an overhead water supply tank and a steel locker, are usually from 7 to 7½ ft. long. Both of these rooms open out onto a side aisle or hall, 2 ft. wide, which connects the dining room and the foreman's office.

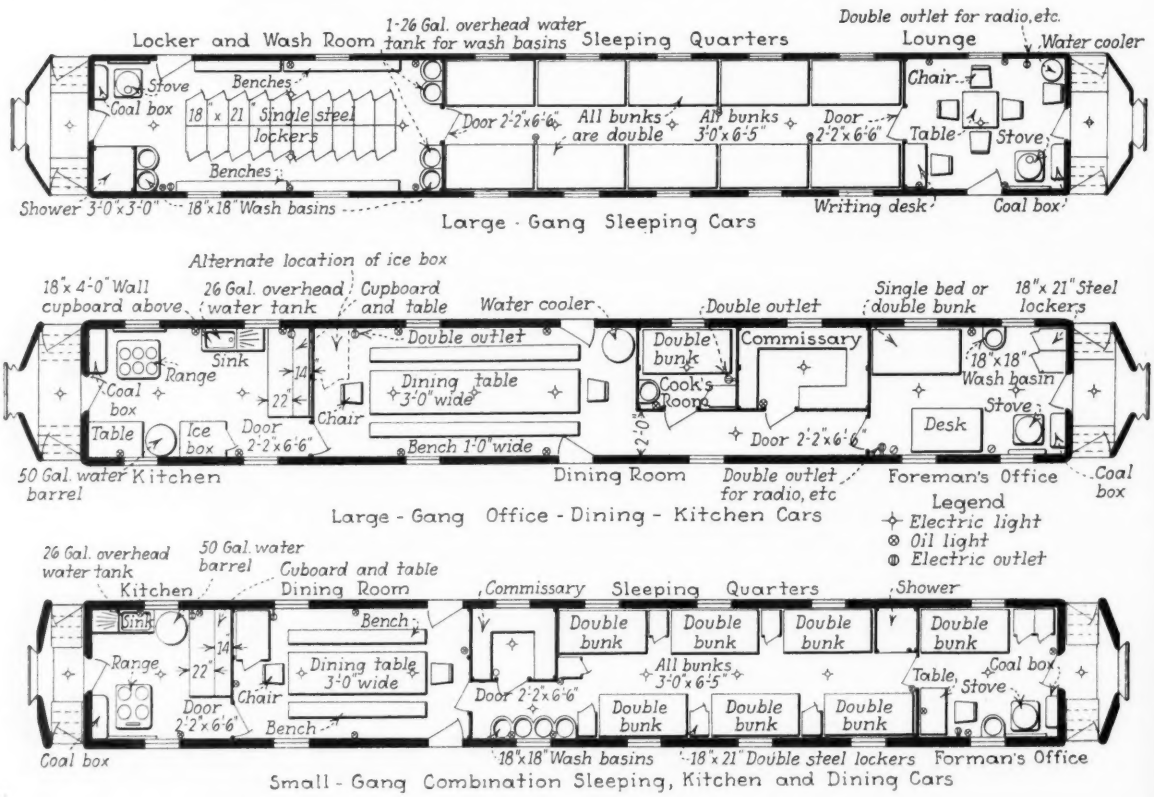
The new combination sleeping and dining cars for small gangs, which include complete field housing facilities for such forces, were adapted largely from the old passenger coaches and parlor cars because the greater length of these cars afforded increased room for the facilities required. The layout of these combination cars provides a 10 to 11-ft. kitchen at one end, with practically the same equipment as that provided in the large-gang dining cars; a 17 to 17½-ft. dining room with a 9 to 10½-ft. dining table, and also housing a refrigerator; a sleeping room 28 to 31 ft. long, with six double bunks, and a shower stall at one end and wash basins and a commissary compartment at the other; and a foreman's office at the end of the car opposite the kitchen, usually from 10½ to 11½ ft. long, which it fitted with a double bunk, a writing table, a wash basin, two steel lockers and a stove.

The commissary, while within and opening into the sleeping quarters, is a completely walled-in compartment. This area, which in the different cars of this design is from 5½ to 7 ft. long and usually 4½ ft. wide, is fitted with 18-in. shelves spaced 18 in. apart from the floor to the ceiling.

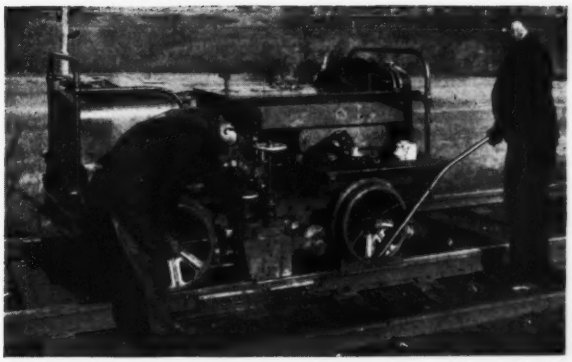
These new camp cars of the three different types were altered and fitted up at the Russell car shops of the road. They were painted C. & O. standard gray, both inside and outside; roofs were repaired where necessary; all windows and doors were provided with copper screens; water piping with faucets was extended to all wash basins; and all compartments were provided with caboose side oil lamps and were wired for electric lighting and for the operation of electric fans. In connection with the electric wiring, each car was supplied with 150 ft. of No. 10 weather-proof cord for use as a lead-in from any 110-volt supply line near the camp location.

The delivery of the new camp cars was spread over a period of 18 months, the work being handled as convenient by the regular forces at the shops. As each group of cars came out for service, a group of the older existing camp cars was retired and sent to the shop for the salvage of such materials and fittings as could be used in fitting up the subsequent group of new cars to be worked on. There was little salvageable about the old cars themselves, practically all of which were old 35-ft. box cars, but a large amount of interior equipment and fittings in good condition were removed, this including, to the end of 1935, 22 refrigerators, 36 water coolers, 81 heating stoves, 20 cooking ranges, 133 wash basins, 15 kitchen sinks, 7 water tanks, 112 lockers, 56 single bunks, 151 double bunks, 410 oil lamps and 391 lamp brackets.

Converting the passenger train equipment into camp cars cost approximately $800 to $900 per car, depending upon the amount of work required, while the expenditure involved in the entire program amounted to about $100,000. The plans for the new cars were prepared under the direction of C. J. Geyer, engineer maintenance of way of the Chesapeake and Ohio.



Floor Plans and Equipment Layouts of Three Types of Passenger Equipment Camp Cars



Left—A Surface Grinder of the Reciprocating Type. Below—A Cup-Wheel "Precision" Grinder

Rail Grinders—

What Progress in Their Development?

Since track grinders were first introduced they have been subjected to a continuous process of redesign and development in an effort to improve their performance and the quality of the work done. With the object of reviewing this development, a sub-committee of the Committee on Maintenance of Way Work Equipment of the American Railway Engineering Association prepared a report which was presented at the last convention of this association. This report is abstracted herewith.

TRACK grinding machines can be classified between (a) Rail surface grinders; (b) side-flow grinders and (c) cross grinders. Rail surface grinders can be further sub-divided into two general classes: (1) Those using revolving wheels, and (2) those of the reciprocating type, in which the grinding blocks are moved back and forth along the surface of the rail head. Furthermore, there are two types of rail surface grinders using revolving wheels, including (a) those in which the grinding is done with the edge of a wheel, and (b) those in which the grinding is done by the flat face of a cup wheel.

The earliest of the revolving surface grinders of the peripheral grinding type consisted of a 6-in. or 8-in. wheel, mounted on the spindle of an air or electric motor, the machine being held in the hands of the workman and the circumference of the wheel being pressed against the metal to be removed. Needless to say, there was no pretension to accuracy in the performance of this grinder, but it did provide a tool which had previously been lacking.

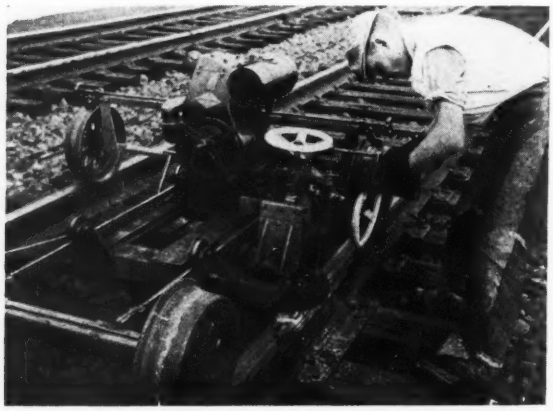
In an effort to develop a machine that would not require the use of an air compressor, or the presence of a source of electrical power, the Stow Manufacturing Company produced a portable unit powered with a Briggs & Stratton engine of 3 to 4 hp., and provided with a directly connected flexible shaft, carrying at the end a spindle with handles and guard. As this arrangement did not prove satisfactory, a countershaft was introduced with a V-belt drive, in which the shaft was mounted with a cam arrangement so that the tension of the belts could be released when starting or stopping the engine.

The next development of a self-contained grinder of this type was by the Nordberg Manufacturing Company. The machine developed by this company was provided with dolly wheels to run on one rail, and with an extension arm and roller to bear on the other rail. Circular steel hoops surrounded the engine so that it could be rolled off the track on the approach of a train. The operator could tow the machine along the track by means of the flexible shaft, grinding the joints first on one rail and then on the other.

In the meantime, the Railway Track-Work Company, had, for many years, been building several types of track grinders for electric railways. These grinders were powered with 500 volt d-c. motors, taking current through a pole hooked over the trolley wire and being rolled off the track on to the pavement to allow the passage of cars. These grinders were used to finish the surfaces of rail ends that had been built up by electric welding, and after the steam roads adopted this process the same type of machines were used by Teleweld, Inc.

Subsequently, the Railway Track-Work Company introduced its gasoline engine driven grinders. In these units the wheel is supported in the frame of the machine, with the spindle located at right angles to the rail and movable axially across the rail head,

the entire machine being rolled back and forth on the rails by the operator. These machines are in general use and are usually powered by a gasoline engine, the speed of which may be regulated to permit the maintenance of a practically constant peripheral speed of the grinding wheel until it is nearly worn out. This speed adjustment must be closely watched, however, as a grinding wheel designed to do the best work at a cutting speed of 9,500 ft. per min., may suffer a loss in efficiency of as much as 75 per cent if the number of revolutions per minute of the wheel is allowed to fall too low.



A Cup-Wheel Surface Grinder

Grinding machines of this general type have several disadvantages. As the machine rolls back and forth on the rails, any irregularities in the surface of the rail head will be reproduced at the joint being ground. Moreover, as the grinding wheel feed consists of a hand wheel and screw, there is certain to be a free fit between the screw and the nut which embraces it. The result is lost motion which means irregularities in the finished surface. There must also be some freedom of fit between the spindle and its bearings, which increases in amount as the machine grows older. The cumulative result of these small amounts is that the average lost motion in grinders of this type by the middle of the season will be anywhere from .01 or .015 in. up. Another source of error in the ground surface is caused by the wandering of the machine from side to side as it rolls back and forth on the rails. The curve of the top of the rail head cannot be reproduced accurately and it is difficult to form a satisfactory runoff.

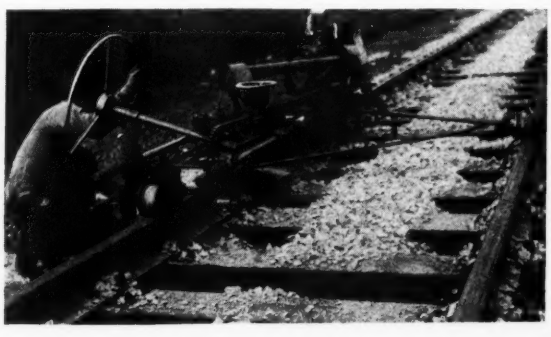
In view of the defects outlined above, efforts have been made in recent years to overcome some of them by the development of the so-called precision grinders. In these machines the under-carriage is similar to the arrangement already described except that the machine, instead of rolling back and forth on the rails, is anchored to the track by applying a brake to the wreels and the grinding wheel is carried by a crosshead which slides on guides.

The machines described above are large and heavy and, in order to have sufficient power to do their work rapidly, they must be equipped with a 10 to 15-hp. gasoline engine and must have strength and rigidity. They cannot, therefore, be readily removed from the track; hence permission to occupy the track must be obtained from the dispatcher. In multiple-track territory this is a serious disadvantage, and a large gang of men must be available to carry the machine off to one side. With a view to overcoming this difficulty, the Railway Track-Work Company has developed a machine in which the grinding wheel is driven by a 3 to 5-hp. electric motor through V-belts and most of the weight is concentrated over the rail being ground. An outrigger reaches to the opposite rail, which may be detached by unlocking a cam, and the machine may be set in the inter-track space to permit the passage of trains. This machine has the disadvantage of requiring an outside source of power, being usually operated from a generator driven by the main welding generator engine.

A modification of the revolving surface grinder is the Fox grinder, in which a spool-shaped wheel, 6 in. in diameter and 8 in. long, is carried on a 2⅜-in. spindle arranged at an angle of 32 deg. to the rail. This machine is mounted on two wheels with an outrigger arm extending to the opposite rail, and is powered with a 5-hp. gas engine. The grinding wheel is carried in a frame which slides back and forth on pipe guides, the machine being locked to the track and driven by a V-belt drive. This machine reproduces the curve of the rail head quite well. It may be removed from the track by one man, using a rerailing device, the outrigger arm being folded inward to keep the machine within clearance limits when it is located in the inter-track space.

Another development is the use of the Fox grinder for grinding corrugated rail. In this work, a battery of four machines is moved slowly along the rail, each taking off from 0.002 to 0.003 in. from the top of the high spots.

Early efforts to develop a rotary surface grinder employing the flat surface of a cup wheel for doing the grinding were not successful. However, after considerable study, the Mall Tool Company brought out a grinder employing this principle, in which an 8-in. cup wheel was mounted on an angle spindle driven by a flexible shaft. The source of power was a Briggs & Stratton gasoline engine, the drive being by means of a V-belt to a countershaft to which the flexible shaft was connected. By making the driving pulley on the engine and the driven pulley on the countershaft in the ratio of 5 to 3, the engine can run at a reasonable speed, say, 1,800 r.p.m., thus insuring longer life and less frequent repairs. One advantage of a cup wheel is that it runs at a constant speed and when the governor of the engine is once set to give the proper peripheral speed of 8,500 ft. per min. to the wheel, there is no necessity for changing it as the wheel wears down.



Another Type of Rotary Surface Grinder

Various mountings are employed for this type of grinder. In one of

these the engine is centered over one rail, with light detachable axles extending to the opposite rail so that the machine may be lifted off the track and placed between tracks on multiple-track systems to permit the passage of trains. In addition, a wheelbarrow mounting has been developed in which a 20-in. by 3-in. pneumatic tired wheel is placed at one end so that the machine can be rolled along the right of way independently of the track. These wheelbarrow type grinders are also manufactured by the Railway Track-Work Company and the Nordberg Manufacturing Company, and quite a number of them are in service in various parts of the country.

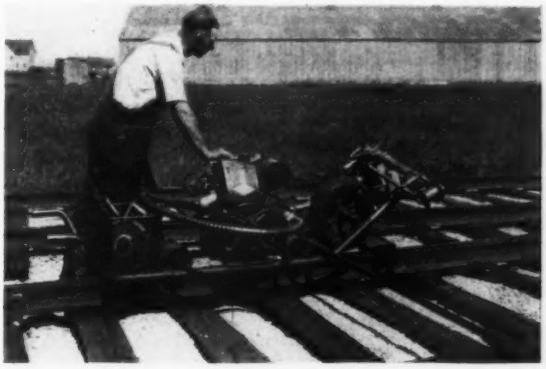
While grinders consisting of a cup wheel on an angle spindle at the end of a flexible shaft employ none of the ideas embodied in the so-called "precision" grinders, they have, as a matter of fact, the ability to accomplish the desired end, namely, the grinding of a surface, true to a straight-edge, with an error of 0.002 in. or less. Wear in the spindle bearings or lost motion in any of the parts has no effect on the accuracy of the work, and the machine will perform as satisfactorily at the end of the season as when it is new. When using this type of grinder in this manner, the workman is trained to grind to his straight-edge, noting where the high spots are and grinding them down. In this way he obtains a true surface in a minimum length of time and with any allowable error that may be specified.

Reciprocating Grinders

In the development of reciprocating grinders, the Railway Track-Work Company was a pioneer, having had considerable experience in the street railway field. In that field rail corrugation has been a problem for many years, and the reciprocating grinder was first developed for the purpose of removing the corrugations. Relatively recently, rail corrugation has made its appearance on steam railroads, necessitating that reciprocating grinders be adapted to steam railway use.

The Railway Track-Work company has developed two types of reciprocating grinders for steam railroad use. One of these is a heavy double-sided machine powered with a Ford engine, which occupies the track and must be run to a siding to clear trains. This machine is provided with grinding blocks, 3½ in. by 4 in. in section and 10 in. long, which soon take the shape of the rail head and form a practically perfect surface. The crosshead carrying the blocks is moved back and forth on a stroke of 3¼ in. at a rate of 200 per minute. This machine has also been used for correcting the surface at joints where the batter is not over 0.01 to 0.02 in., and is used to grind newly-laid rail or cropped rail to bring the surfaces of the abutting ends to the same plane.

The other reciprocating grinder manufactured by this company is a lighter machine designed to operate on one rail. This machine, which can be lifted off the track and placed between tracks to permit the passage of trains, is powered by a Briggs & Stratton gasoline engine and, of course, requires more time to grind a joint than the more powerful double-sided machine. However, because it usually is able to work a greater proportion of the time and has much lower interest, depreciation and repair charges there is little difference in the cost per joint as compared with the heavier machine.



A Portable Outfit With Which Various Types of Grinding Wheels May be Used

Side-Flow Grinders

The development of machines for grinding off the side flow on stock rails also presented a difficult problem. Among the machines developed to accomplish this purpose was one brought out by the Ingersoll-Rand Company, which was equipped with a cup wheel operated by an air motor. This machine was operated by working it back and forth like a lawn mower, the cup wheel being pressed against the rail head by a roller on the opposite side of the rail head, with pressure being exerted by a lever in the hand of the operator. Subsequently, the Railway Track-Work Company brought out its P-16 machine, having a gasoline engine drive, while several manufacturers have devised cup wheel attachments with flexible shaft drives for stock rail grinding, the dressing up of switch points, etc., and these are doing very satisfactory work.

The earliest method employed for forming a V-notch where rail ends butt together in a joint was by means of a triangular file in the hands of a workman. Subsequently a machine was developed in which a parting tool was forced across the rail ends, the actuating force being supplied by a workman who operated a lever. But the cutting of hard cold-rolled rail ends is a difficult job for even the best tool steel. However, the advent of the Bakelite bond and progress in the wheel maker's art resulted in the production of thin high-speed wheels which can be used successfully for the cross-grinding operation. Such wheels, 6 in. or 8 in. in diameter and ⅛-in. thick, can be operated at a peripheral speed of 16,000 ft. per min.

Cross-Grinder Mountings

Cross grinders employing such wheels were usually mounted on a chassis consisting of a light four-wheel carriage with handles at each end, which could be set off between the tracks to allow the passage of trains. The axles were light tubing supporting a frame on which was mounted a gasoline engine which was belted to the wheel spindles. The frame could be moved to one end of the chassis for the cross-grinding of a joint on one rail and then moved to the other end for the cross grinding of the next joint in the opposite rail. The work was fast and cheap, the average output for these grinders being about a joint a minute.

Several manufacturers then developed cross grinding attachments for their flexible shaft outfits in which the grinding wheel was usually supported in a frame which was clamped to the rail. Some time later the Keystone Grinder Company developed a multiple-spindle machine carrying 2 or 3 different thicknesses of wheels at each end so that wheels are available for grinding tight joints, those with a moderate gap or those having a wide gap. Other developments along this line are the Model P-11 grinder of the Railway Track-Work Company and the precision grinder that is manufactured by the Northwestern Motor Company, Eau Claire, Wis.

Mixing and Handling

CONCRETE mixing and handling machinery is made in many different sizes and types to meet a multitude of conditions on jobs ranging from a small machine foundation to dams and bridges which require thousands of cubic yards of concrete.

The kind of equipment best suited to a particular job is governed by (A) The design and extent of the structure; (B) the location relative to railways, navigable rivers, or highways, over which the raw materials are to be transported; (C) the distance of the job from the sources of supply of the raw materials; (D) the time available to complete the job and the available labor supply; and (E) the local topography and water supply, which affect the location of the mixing plant and the distribution of concrete on the job.

It is impossible, therefore, to lay down hard and fast rules governing the kind of machinery to be used on a particular job because of this wide variation in local conditions

A Mixer Plant with Overhead Aggregate Bins and Batcher, with Car-Mounted Delivery Hopper in the Foreground

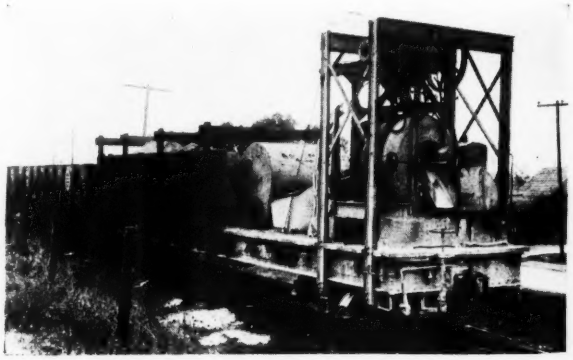
Concrete Mixers

As its name implies, the purpose of the concrete mixer is to mix thoroughly the materials which go to make up the concrete. It consists essentially of a rotating horizontal metal drum that varies in size from 2½ to 112 cu. ft. of mixed concrete. It rotates from 10 r.p.m. for the larger sizes up to 20 r.p.m. for the smaller sizes and the mounting provides not only for rotation, but, in the tilting type, for the tilting of the drum as well.

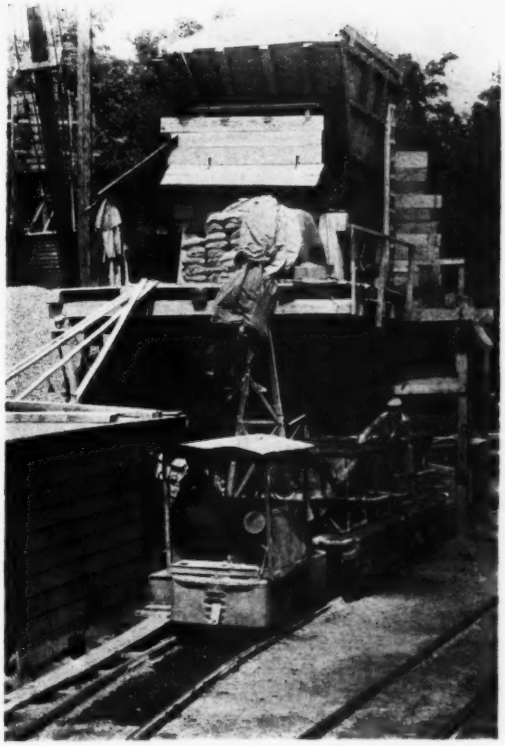
Various means are employed for charging the materials into the mixing drum. In the smallest sizes this may be done by hand. Usually, however, some form of charging device is provided. On the larger mixers, this consists of a fixed hopper in which the materials are placed and fed into the drum by gravity through a hand-operated gate. The most popular device consists of a skip-pan or power loader, into which the materials are placed when it is in its lowered position. Water is introduced into the smaller machines by means of a hand hose or bucket. Most of the larger machines, however, are equipped with a measuring tank mounted above the mixing drum, from which a definite amount of water can be injected by gravity into the open end of the mixing drum.

Discharge of the completed mixture is accomplished either by tilting the drum or by a delivery chute. The chute, which is carried on a system of levers, is swung clear of the blades during the mixing process. The drum-tilting device is operated by power on the large mixers and by a hand gear or lever on the smaller ones. The majority of concrete mixers are portable, and some are mounted on motortruck chassis to provide for the mixing of the concrete while in transit to the point of delivery.

Several special devices and attachments may be applied to concrete mixers. These include batch meters for recording the number of batches and to insure uniform mix-



Car-Mounted Mixer Designed for Chuting of Concrete Into Forms Below Track Level



Narrow-Gage Concrete Train Receiving Charge From a Central Mixing Plant

Concrete

This is abstracted from a report of the Committee on Maintenance of Way Work Equipment of the American Railway Engineering Association, which was presented at its recent convention. The report discusses the types and sizes of concrete mixing and handling equipment and touches on the economics of their use and their suitability for railway applications.

ing, skip scales for weighing the materials for each batch, weighing hoppers for determining the weight of the mixed concrete, winch or capstan drums and various kinds of power take-offs for driving other machinery from the power plant when the mixer is not running. Oil-burning heaters are also available for mounting on the mixer, in which the flame is directed into the drum to prevent freezing in cold weather. The value of these special appliances depends on the kind of work to be done to a large extent.

In considering the relative merits of the various types of concrete mixers and their appliances, it should be borne in mind that each was developed for some general class of work and its design is a result of experience under the conditions for which it is intended. Concrete mixers fall into two general classes, however, according to the method of discharging the mixed concrete from the drum, i.e., tilting and non-tilting. The mounting and driving mechanism of the tilting mixer is more complicated and expensive than that of the non-tilting type. However, its rate of discharging the mixed concrete is faster and the drum clears itself more completely. The tilting type is not practical, however, on a motor truck or trailer chassis.

The simplest form of charging equipment is the fixed hopper. Most of the smaller mixers are equipped with this device, as the hopper is low enough to allow the placing of the materials with a hand shovel from the ground. In the larger mixers the fixed hopper is less convenient as it must be reached by a raised platform and ramp or some other form of elevating device. It is popular in large cities, however, where union demands on power-loader types make labor costs high. On mixers of medium size, the skip or power loader attached directly to the machine is the most convenient, since it is easily reached from the ground for placing the materials.

The electric motor has the disadvantage of being dependent on an external source of electric current and its use is restricted to locations where such power is available. The most widely used power unit is the gasoline engine, because it is independent of external sources of power supply. Its principal disadvantages, compared to the electric motor, are its higher first cost and maintenance cost and the fact that it is somewhat more complicated to operate.

Dumping Transit-Mixed Concrete From the Truck Into the Forms

Mobile Mounting Popular

Since most concrete-mixer installations are temporary and the machines must be portable, the mobile type of mounting is the most popular. A form of mobile mounting

well adapted to a special purpose is that in which the mixing plant is mounted on a flat car and is equipped with conveyors for handling the materials from adjacent cars. It is sometimes used when constructing pole or tower foundations, tunnel linings, etc.

Concrete mixers are rated according to the amount of concrete delivered per batch. A one-bag batch of 1:3:6 ratio is equivalent to about 7 cu. ft. of mixed concrete, and this unit is in general use in rating the capacity of mixers. The rated capacity for unmixed dry materials is based on 35 per cent of voids and is approximately 57 per cent greater than the mixed capacity. The output rating, usually expressed in cubic yards per day, is based on 40 batches per hour and a 10-hour working day. The accompanying table shows the standard sizes of concrete mixers available, giving mixed and unmixed capacity, output, power required and the number of bags per batch, based on a 1:3:6 mixture.

Most Economical Size

From the standpoint of operating cost, the most economical size of mixer to use on any particular job will depend on the amount of concrete to be deposited and the time available for completing the work. In other words, it is governed by the output of the machine. It is only rarely, however, that any one job is large enough to justify the purchase of the most suitable mixer. In most cases, and particularly in railroad work, the size of the mixer depends on the equipment owned.

Standard Sizes of Concrete Mixers

Capacity mixed concrete, cu. ft.	Capacity unmixed materials, cu. ft.	Output per 10-hr. day, cu. yd.	Power required, hp.	Bags per batch
2.5	4.0	37	1.5	¼
3.5	5.5	50	2.0	½
5.0	7.5	74	3.0	½
7.0	11.0	100	5.0	1
10.0	16.0	148	7.5	2
14.0	22.0	200	10.0	2
21.0	32.0	310	15.0	3
28.0	45.0	415	20.0	4
40.0	64.0	590	30.0	6
56.0	88.0	800	40.0	8
112.0	178.0	1600	75.0	18

Several factors affect the economics involved. Thus a small mixer may slow up the depositing of the concrete and thereby increase construction costs. On the other hand, a larger and more expensive mixer which will mix concrete as fast as it can be deposited, may hold down construction costs while in use, but offset this saving by increased overhead expense if it stands idle a considerable part of the time.

The term concrete-handling machine includes all devices and equipment used to convey the concrete from the mixing plant to the forms. There is a considerable variety of such equipment available and the type used on any particular job is affected by local conditions to an even greater extent than is the type of mixer used. Concrete-handling machinery falls into two general classes—mobile and stationary. Usually a combination of the two is used.

The simplest and least expensive mobile equipment is the ordinary wheelbarrow. It has a capacity of 1½ to 2 cu ft. of mixed concrete. Because of its small capacity and the labor required to move it, the wheelbarrow is most suitable for use on small jobs where the concrete must be moved only a short distance from the mixer and where the expense of more elaborate and efficient equipment is not justified.

A Standard Portable Concrete Mixer

The concrete cart is an improvement on the wheelbarrow. It consists of an open-top steel body, carried on two large wheels, is equipped with handles at one end for pushing, and is so mounted that its center of gravity is below the wheel centers. This provides stability while in motion and allows for easy tilting when unloading. It has a capacity of from 5 to 6½ cu. ft., and because of its greater capacity and ease of movement it has a considerably wider range than the wheelbarrow.

Radial Gate Car

The radial-gate concrete car is a further development of the two-wheel cart. It consists of a steel hopper mounted on four flanged wheels to run on tracks, usually of 24-in. gage. The car is usually moved to the point of discharge by means of a small locomotive. It has a capacity of from 24 to 32 cu. ft. of mixed concrete and is used on jobs requiring the movement of large quantities of concrete a considerable distance from the mixing plant, where the use of wheelbarrows or carts would not be practicable. Another form is the concrete truck, which consists of an open-tank body mounted on a motor truck chassis. The tank is equipped with an agitator driven from the truck motor to prevent the concrete from setting in transit. These trucks have a capacity of from 1 to 8 cu. yd. of mixed concrete and are used principally to deliver ready-mixed concrete from central mixing plants.

The most widely used form of stationary equipment consists of a tower or mast provided with a skip hoist, elevated hopper and radial chute for distributing the concrete to the forms. The chute sections are made in the form of open troughs with arch bands, or as closed pipes, 12 in. to 20 in. in diameter and from 10 to 50 ft. long. The angle of the chute with the horizontal should allow the concrete to flow without separation of the ingredients. In general, about 27 deg., or one vertical to two horizontal, is considered good practice.

Another Type

Another type of gravity-placing plant consists of an inclined track carried on trestle-work, provided with a hopper and gravity chute at its upper end, on which a skip car runs. This plant can be made portable by mounting the trestle and mixer on a string of flat cars. In general, the inclined-track plant is easier to set up and take down than the mast or tower plant, but it does not cover so wide a range of work.

The dump bucket may also be classed as stationary concrete-handling equipment. It consists of a circular steel bucket, provided with a yoke for hoisting, and a knife-type sliding gate at the bottom to control the discharge of the concrete. It is made in sizes of from 36 to 118 cu. ft. and is used principally in conjunction with gravity-placing plants where the flow of concrete to the forms must be controlled carefully

The past and future design of concrete-mixing and handling machinery has been and will be influenced by the requirements of contractors to a far greater extent than by the requirements of railways. This is because most of the mixing and handling machinery in use, even on railway jobs, is owned and operated by contractors. Yet sufficient kinds or types of such equipment are available to suit all railway requirements.

This Combination Plank and Bituminous Macadam Platform Shows Little Sign of Wear or Destruction After Several Years of Service

Better Inter-Track Platforms Station Tracks

This article describes two modifications of ordinary plank and bituminous macadam inter-track platforms which are being used by the Erie successfully at a number of stations. Both modified types are little affected by wave motion in the rail and permit ready exposure of the track for routine surfacing and joint maintenance work.

IN RECENT years, the Erie has been using with success two modifications of the ordinary bituminous and timber inter-track passenger platforms, which have been found to be highly satisfactory from the standpoint of both passenger use and baggage trucking, and which are less costly to maintain in good condition than the earlier types of platforms. Furthermore, both of the modified types are economical of construction and are little affected by the wave motion in the track under traffic, and both permit ready access to the inner ends of the ties of adjacent tracks for such track surfacing, joint maintenance or other work as may be necessary from time to time. One of these types consists of timber throughout in removable panels, while the other is a combination of bituminous macadam and timber.

The all-timber platform, which is designed to extend from near rail to near rail of adjacent tracks, is essentially a succession of removable sections 16 ft. long, which are laid end to end and given support on the ends of the ties. The individual sections, or panels, are made up essentially of 4-in. by 10-in. planks, 16 ft. long, although 4-in. by 12-in. planks are used along each side adjacent to the rails. These planks are spiked to four 4-in. by 8-in. nailers, equally spaced along the bottom. The planks are laid tight, the number employed depending upon the distance between adjacent rail heads. Where the use of the 10-in. and 12-in. planks does not produce a tight platform from rail to rail, a strip of plank is cut to fit the opening and is set in place through the center of the platform panel.

The nailers, the ends of which are framed to rest squarely on the ends of the ties of the adjacent tracks, extend practically the full distance from rail to rail. At both ends, they are suitably notched to clear the bases of the rails, the tie plates and spikes, and also so that the top surface of the platform will be level with the tops of the rails.

Creosoted yellow pine is used throughout in this construction, the only difference in the timbers, except for dimensions, being that the nailers

The Inter-Track Macadam Platforms Extending from Rail to Rail Required Constant Patching Along the Rails, Particularly at Joints, and Did Not Permit Proper Tamping of the Crossties

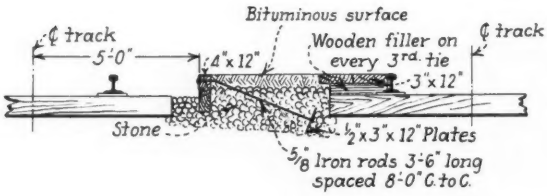
are rough sawed, while the planking is planed on all four sides. All new surfaces of the nailers exposed by notching in the field are swabbed with hot creosote.

The platform panels are fabricated with 60d nails, and each panel is secured in place by means of two ¾-in. by 11-in. lag screws at each end of each nailer. All lag screw heads, which are equipped with flat washers, are countersunk into the planking, and the holes are filled with a plastic asphalt. This produces an entirely smooth platform.

The individual panels, which weigh approximately 1,800 lb., can be readily lifted and slewed one way or the other by a locomotive crane to permit surfacing of either track. They can also be barred out of and back into place with ordinary track bars if a crane is not available.

The combination bituminous and plank platform, which is adapted for extending from rail to rail in the inter-track space, or from one rail to truck clearance from the opposite rail, depending upon the width of platform required, consists essentially of lines of plank over the tie ends, with the bituminous material in the inter-track space between opposite tie ends. The fundamental purpose of this design is to prevent the breaking up of the bituminous material with vertical movement in the track, and, at the same time, to permit ready access to the tie ends for proper surfacing or joint maintenance, without disturbing the main body of the platform.

Where the platform is to extend from rail to rail, two lines of 3-in. or 4-in. creosoted yellow pine plank, 12 in. wide, are laid over the tie ends on filler blocks on every third tie, so that the tops of the planks are flush with the tops of the rails. These planks are lagged to the ties through the filler blocks, the lag heads being countersunk and the holes filled with plastic asphalt. Between the plank-covered tie ends of opposite tracks, a bituminous macadam is laid directly upon a deep, clean, well-compacted course of ordinary ballast stone, and is then rolled or tamped to a hard compact wearing surface.



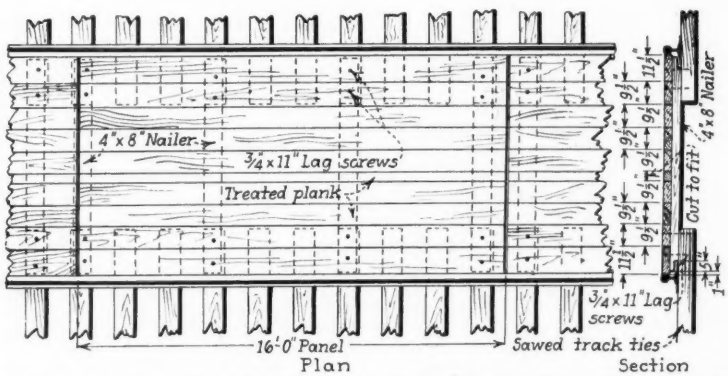
Section Showing Details of Construction of the Bituminous Type Inter-Track Platform with Removable Planking Placed Over the Ends of the Ties

Where the distance between track centers is such as to produce a platform wider than necessary if carried from rail to rail, the Erie has used the plank construction, as described, on only one side of the inter-track space, and has retained the opposite side of the platform, a minimum distance of 5 ft. from the center line of the adjacent track, by means of a 4-in. by 12-in. creosoted timber curb. This curb timber is set on edge in the inter-track ballast and bolted to 6-in. by 8-in. by 2-ft. 6-in. treated timber posts at intervals of 8 ft. It is further secured at each post by a ⅝-in. iron tie rod, which extends through the curb and post, back to a 6-in. by 8-in. by 2-ft. 6-in. treated timber "dead man" buried vertically in the inter-track ballast. Each post and its "dead man" anchor are held in a fixed relation to each other by means of a 3-in. by 8-in. treated wood strut or spacer between them.

The asphalt mixture which has been used in this type of construction on the Erie is not unlike that used commonly for various types of platforms and for grade crossing pavements, consisting essentially of graded mineral aggregates with an asphaltic cement binder. The Eastern district of the road has been employing considerable material called Clintex, which is mixed hot at a commercial mixing plant and is shipped to the railroad in either carload lots to be unloaded by a locomotive crane, or in dump trucks where small quantities are required within trucking distance from the mixing plant.

While the material is mixed hot, and usually loaded hot, it is readily handled and worked at a temperature as low as 70 deg. F. before being compacted. Compacting in the platform can be done with either hand tampers or hand rollers.

In the case of the combination plank and bituminous macadam platform, whether extending from rail to rail, or only part way to a curbing, the macadam surface is little disturbed by flexibility in the track, and need not be disturbed at all when it is desired to tamp ties or to give special attention to rail joints. All that needs to be done to expose either track completely with this type of platform is to back out the lag screws holding the planking and then to remove the planking.



Plan and Section of the Plank Panel-Type Inter-Track Platforms Being Used on the Erie

Southern Pacific Uses Special Rig to Drive Slip Piles

SPECIAL extension leads are used by the Southern Pacific in the driving of replacement piles in its ferry slips in San Francisco bay. These slips are built with three or four rows of piles, the rows being about a foot apart and the piles are three feet center to center in the rows. When it becomes necessary to replace piles damaged by breakage or by marine borers, it is customary to drive new piles in the spaces between the old piles to avoid tearing the structure apart.

View of the Special Pile-Driving Rig Used on the Southern Pacific

As these slips are usually occupied by a ferry at definite intervals throughout the day, the use of a floating driver for the driving of the piles is inconvenient and expensive, owing to the necessity for clearing the slip frequently. For this reason the Southern Pacific has adopted the practice of driving these piles with a skid driver from the land or dock side, wherever open space is available for the operation of such a driver.

Extension Leads

However, owing to the fact that the cut-off elevation of these slip piles is normally higher than the floor level of the dock, only the piles in the first row on the land side can be driven with the ordinary leads, and this has given rise to the extension leads shown in the illustration. As will be noted, these consist of a second set of leads, bracketed in front of the regular leads and made short enough to clear the top of the piles in the slip. The hammer and pile lines are carried over a second set of sheaves at the top of the extension leads.

This arrangement works well, but cannot be applied where the space behind the piles is covered with a building. Where this condition obtains, there is no choice but to drive the piles with a marine driver.

Laying 282 Miles of Rail

(Continued from page 535)

18 men with the work train, approximated 160 men, although this number varied from time to time, owing to the customary labor turnover on work of this kind. Also, while the number of men indicated as comprising each unit was the standard set up for the normal operation, men were shifted from one unit to another to insure that all of the units progressed at the same rate.

No Important Departure

In the organization of the gangs for carrying out this large program, and in the methods employed in laying the rail, the North Western did not depart in any important particular from the practices which it has followed for a number of years. In planning the work, however, several considerations were constantly before the maintenance officers of the road, including (1) the desirability of completing the program as rapidly as compatible with good workmanship, to shorten the period of interference with traffic; (2) to provide the force necessary for this purpose, at the same time striking an economic balance between the number of gangs to be employed and the investment in power machines and tools necessary to equip them; and (3) to assign the right number of men to the individual gangs to insure maximum use of the power equipment, at the same time maintaining a proper balance of hand labor without imposing an undue burden on the men comprising the various units yet keeping the man-hour production at a high level.

Not the least important part of the planning was the scheduling of the work. This feature was studied as carefully as other items, and a complete schedule was prepared for each gang, showing not only where it was to work but the time of starting, the daily progress expected and the estimated date of completion of each stretch of track to be laid. Progress charts were prepared in advance on this basis, and as the daily reports came in they were plotted on the chart. In this way the engineer maintenance was in constant touch with the performance of each gang and was able to see at a glance how the actual progress compared with the schedule. It is of interest, therefore, that while there were minor variations from the schedule, the reasons for which have already been explained, the gangs individually maintained an average very close to the estimated progress, and that the entire program, except for a short stretch on one of the secondary main lines, which was held in abeyance temporarily, was completed in accordance with the schedule.

The organization of the rail gangs, the preparation of the schedule and the laying of the rail were done by and under the direction of B. R. Kulp, engineer maintenance.

Baerental Station on the German State Railways in the Black Forest

What Length and Width of Adze?

What width and length of adze is best suited for adzing ties? Why?

Length Depends on Rail

By H. R. Clarke
Engineer Maintenance of Way, Chicago, Burlington & Quincy, Chicago

After trying adzes of different widths the Burlington finally adopted an adze with a 4-in. face. This width is such that two strokes, if placed accurately, will cover the full width of the average tie and is wide enough so that the adzed surface can be made uniformly smooth and level when completed. With a narrower blade there is a tendency to groove the tie when adzing and more strokes are required to do the work. With a width greater than 4 in., it is difficult to sink an adze to a reasonable depth, particularly in a hardwood tie. For these reasons, a width of 4 in. seems to be most satisfactory.

The proper length for an adze depends largely on the conditions under which it is being used. If adzing is being done with the rail in place, that is, if an effort is being made to adze over the rail, a longer adze is required with the higher rail sections than with the older and lower rail sections.

When we began to use 110 and 112-lb. rail, we found that the adze we had been using was too short, and again, after trying several lengths, we adopted a length of 10¼ in. This was done because at that time the manufacturer from whom we were purchasing adzes included one of that length among his standards. I consider either 10 in. or 10½ in. satisfactory. It is our practice, so far as possible, to use the new and full-length adzes on main lines where the heavier rail sections are laid, and as their length is reduced through sharpening, we send them to branch lines where the rail is lighter and lower.

We adopted what is approximately a 10-in. adze for the reason that this seems necessary when adzing 110 and 112-lb. rail in place. This length permits a reasonable amount of the blade to be removed in sharpening, and still remain satisfactory for use with these rail sections. Then as the blade is shortened further by grinding, it can still be used to advantage where lower rail is in service. We have found that an adze longer than approximately 10 in. is rather cumbersome and unhandy to use, although perhaps the longer size might be necessary with higher rail sections, such as the 152-lb. rail.

Depends on Width of Base

By W. H. Sparks
General Inspector of Track, Chesapeake & Ohio, Russell, Ky.

Probably the most important factor affecting the length of an adze is the width of the base of the rail. The blade should by all means be of sufficient length to make it possible to cut clear through under the base without striking the rail and thus stinging the user's hands and perhaps breaking the handle. The height of the rail must obviously be taken into account, but an adze that is long enough to cut under the base will usually be satisfactory for the height. For this reason, I recommend a length of 7 or 8 in., for rail heavier than 100 lb. and 6 or 7 in. for sections of 100 lb. or less. The width should be about 4 in. A wide blade makes adzing difficult, particularly on hardwood ties, while with a narrow one it is not easy to do a smooth job.

Where ties are pre-adzed it is no longer necessary to adze them as they are inserted, while mechanical adzing is largely supplanting hand adzing in rail renewal. For these reasons, hand adzing is now confined largely to gagging and other routine maintenance.

Send your answers to any of the questions to the What's the Answer editor. He will welcome also any questions you wish to have discussed.

To Be Answered in November

1. *When transposing rails on curves, should they be turned? Why?*
2. *What are the advantages and disadvantages of using hydrated lime in concrete? How much lime should be added?*
3. *Where should anti-creepers be applied at turnouts and insulated joints? Why?*
4. *What practical method can be employed to clean the surface of a pressed brick wall?*
5. *Under what conditions should gage rods be applied on curves on main-line tracks? What are the advantages? What is the minimum degree of curve upon which it is economical to use them?*
6. *Under what conditions is it practicable to use explosives in deep wells to increase the flow of water? What are the advantages and disadvantages?*
7. *Should motor cars be covered with a tarpaulin when they are set off the track? Why?*
8. *When should the inspection be made to determine next year's painting requirements? Who should be in charge and who should accompany the inspection party? What details should be observed?*

Must Be Compromise

By R. W. KLINE
Division Engineer, Atchison, Topeka & Santa Fe, Winslow, Ariz.

Experience has demonstrated to our satisfaction that the best size for an adze must be a compromise between a tool for use on sound clean timber and a heavier one for such timbers as ties that always have a large amount of sand and grit in the wood at the point where adzing is necessary. An adze 4 in. wide and ⅛ in. thick will give excellent results on clean timber. On the other hand, an adze 5 in. wide at the bit, with a 6-in. blade ¼ in. thick, and having a 5-lb. head will last longer and give better results where ties are to be adzed that are filled with sand and grit.

It is impossible to keep an adze sharp when working on ties in the track. As most of the adzing that is done by trackmen is on ties in the track, a greater thickness of the blade tends to prevent nicks and provides additional metal for sharpening. This results in a longer period of usefulness for the tool.

Prefers a Ship Adze

By JOSEPH HAZELWOOD
Bridge Foreman, New York, Chicago & St. Louis, Frankfort, Ind.

Adzes for ties should be of the type commonly known as a ship adze rather than a carpenter's adze, since the latter is too light and the blade is too short and wide to adapt it for cutting around spikes or under the rail. The blade should be 4½ to 5 in. wide and 6 in. long, and the tool should have sufficient weight to insure that it will score to the full depth at each stroke. This width is desirable so that two strokes will score the full width of the tie; and the length should be sufficient to reach through under the base.

How Many Fire Extinguishers?

How many fire extinguishers should be placed at small stations? Where should they be located? Why? How often should they be inspected?

Must Be Ready to Use

By N. F. HICKEY
Superintendent of Insurance, New York New Haven & Hartford, New Haven, Conn.

On the New Haven the installation and maintenance of chemical fire extinguishers is given the most careful attention, since a defective extinguisher or one not properly charged is a harmful deception. Much valuable time can be wasted in the attempt to use an extinguisher which does not work readily, thus allowing the fire to get out of control, resulting in larger losses.

When placing extinguishers, the location should be selected carefully with regard to accessibility and necessary heat protection in winter to prevent freezing. We advocate, wherever it is possible to do so, the hanging of extinguishers on window casings on the track side of waiting rooms, between the ticket-office and the platform doors. Extinguishers so located are not only conspicuous to persons within the building, but from the outside as well. In this position they are easily obtained by persons outside of the building by the simple expedient of breaking the window when the building is locked.

Our fire rules require that all chemical extinguishers be recharged once a year, at which time a tag is attached, which shows the date of recharging. All extinguishers are also examined by our inspectors at regular intervals. We have found it advisable for agents at outlying points to have at least two recharges on hand for each extinguisher, and a replacement hose and an acid bottle as well. The number of extinguishers to be assigned will depend on the floor area, but for a small one-story building, one extinguisher, of either the pump-water or chemical type, would seem to be sufficient.

Easy Access Essential

By L. G. BYRD
Supervisor Bridges and Buildings, Missouri Pacific, Poplar Bluff, Mo.

Fire extinguishers should be placed in the most convenient place for obtaining them quickly and surely in case of fire. They should not be so located that there is danger of access to them being cut off if a fire starts. It is our practice to hang them on brackets at the side of office doors which lead into the warehouse or other rooms, where they can be reached without delay when needed. They should be inspected monthly by an experienced water-service or building inspector and recharged once every year. At this time a tag should be attached showing the date of the recharge. Additional charges should be kept on hand for use in case it is necessary to discharge the contents of the extinguisher.

We do not find it necessary or economical to place fire extinguishers in all small buildings, especially where there is only one employee, such as an agent, on duty only a part of the 24 hours. It is important, however, to keep a 50-gal. container filled with water inside of the freight room, close to the door leading from the office, with a regular fire pail placed on top of the barrel. One 50-gal. container full of water should also be kept at each end of the depot, resting on a small platform provided for this purpose, with fire pails attached to the top of the barrel. In addition, a ladder should be hung on brackets at one end of the building to provide a means for reaching roof fires.

Inspection of the equipment is especially important to insure that it is in working order. For this reason, a water-service inspector should examine all pumps, hose, extinguishers and other equipment that is intended for use in fighting fires.

In the South we have a special case of fire hazard in the cotton platforms which are provided at many stations. On these structures, one fire barrel with pails should be provided for every 500 sq. ft. of platform area.

Based on Floor Area

By FRANK R. JUDD
Engineer of Buildings, Illinois Central, Chicago

A satisfactory procedure to follow in determining the number of fire extinguishers required is to provide a 2½-gal. extinguisher for every 2,500 sq. ft. of floor area, exclusive of freight rooms. It is customary to provide water barrels and buckets for small stations with freight rooms and for small freight stations. A barrel with a capacity of approximately 50 gal., and two buckets, should be provided for the first 2,500 sq. ft. or less, increasing this at the rate of one barrel and two buckets for each additional 1,500 sq. ft. of floor area.

Extinguishers should be located in the waiting rooms where they will be readily accessible and available for immediate use at all times. Obviously, where agents or operators are on duty at all times there should be no objection to placing extinguishers

in the office portion of the station. These extinguishers should be inspected and recharged at least once a year in compliance with the instructions printed on the outside. It is customary to tag each extinguisher to show the date of last inspection and recharge. Water barrels should be inspected at stated intervals to insure that they are being kept full.

Effect of Blowing Down on Ties

What effect does the periodic blowing down of locomotive boilers have on the ties and other parts of the track structure? Why?

Service Life Not Affected

By C. D. Turley
Chief Tie Inspector, Illinois Central, Chicago

Preliminary tests indicate that the service life of ties is not affected by the blowing down of locomotives, but it will require a long time to know definitely whether defects will develop in later years from this practice. The track structure in general receives some damage. Ballast is washed or blown from between the ties and the roadbed is softened, thus weakening the track support. Sludge is blown into the ballast, fouling it and interfering with drainage. Steel bridges are also covered with sludge, with some resulting damage. Worse conditions obtain around water stations and in yards where locomotives are blown down while standing still or moving at low speed. In winter, the blow-off water freezes in the track and at switches, creating undesirable operating and maintenance conditions.

There Are Two Cases

By G. M. Cornell
Assistant Engineer, Chesapeake & Ohio, Richmond, Va.

In general, the effect of engine blow-off can be divided into two cases, the first being where the engines are moving at speed, as on down grades following long up grades, and the second where they are standing or moving slowly, as at water or coaling stations. In the first instance there is no appreciable increase in the cost of track maintenance as a result of the blow-off. The ties generally receive a white coating from the solids in the boiler water, but extensive study indicates that the ties are not injured and that it is not necessary to remove them from the track any sooner than the ties in adjacent sections of the track, which have not been subjected to the blow-off. Rail and fastenings do not show any undue deterioration, the ballast is not fouled and no extraordinary line and surface costs result.

In the second case where the boilers are blown down while the locomotives are standing, there may be some increase in track maintenance. Even in this case, however, the effect on rail and fastenings is negligible, the only noticeable result being the washing off of the oil from the joints and bolts.

Some claim has been made that the ties are softened by the blow-off water and that they are worn out more rapidly than in track on which the boilers are not blown down. This opinion is open to question. A study made of the depth of the seating of tie plates on track subjected to heavy blow-off and on adjacent track carrying the same tonnage but not subject to the blow-off, indicates that the plates seat themselves into the ties as rapidly in one case as in the other. One point often overlooked in this connection is that where heavy blow-off occurs at slow speed there is generally heavy sanding and the engines are worked heavily, both being factors of considerable influence on the life of ties.

Ballast may be affected by locomotive blow-off at low speeds, including the removal or fouling of the ballast and disturbance of line and surface. Chips and cinder ballast are often removed from the cribs between the rails to depths ranging up to 6 in. In general this occurs before the ballast fouls. Gravel ballast may be removed but generally it is not disturbed. The top 2 in. of gravel ballast is often caked and dirty after two to four months of service.

Stone ballast is rarely blown out of the track. It fouls more rapidly than on other track, but this is largely because the locomotives drop cinders and sand at points of concentrated blow-off. Where the ballast is cinders, chips or gravel there may be a slight increase in the cost of maintaining line and surface, particularly where the drainage is poor and the ballast is blown out of the cribs. In stone ballast, however, there is no increased cost unless the drainage is poor. In a few isolated spots the roadbed may be gullied somewhat by the blow-off water, but the extent of such damage will be slight.

Any troubles experienced from blowing down boilers can be eliminated by using stone ballast and, where necessary, providing sub-surface drainage. The effect of water from a locomotive boiler is no more serious than that of an equal amount of rain water, for tests indicate that the temperature of the top of the tie is raised but slightly under blow-off where the locomotive is moving. A few seconds after the water is deposited the temperature of the top of the tie drops slightly below that of the dry tie as the water evaporates from the surface. It will be seen, therefore, that the problem is principally that of providing satisfactory drainage, which is a basic and fundamental requisite for good track in any circumstance.

Has Little Effect

By E. M. Grime
Engineer of Water Service, Northern Pacific, St. Paul, Minn.

Recent tests show that an ordinary locomotive blow-off valve 2 in. in diameter, when fully opened and operated under a boiler pressure of 200 lb., discharges 3.8 gal. of water per second. For blow-off valves discharging directly downward toward the roadbed, there are several types of mufflers in use which break up the stream of water and waste it through a number of holes in a perforated plate, thus distributing it over an area sufficiently wide to avoid washing the ballast. Some blow-off valves discharge at an angle of about 45 deg. to clear the roadway section. Others discharge horizontally to the side and still others in the same way to the rear of the tender.

As a rule, blow-off instructions do not require a maximum blow-off period of more than 10 sec. from two blow-off cocks about every 10 miles. On the whole, it may be said that under the most intensive blowing-down requirements the total amount of water blown out that is likely to reach the roadbed will not be more than 10 gal. a mile.

This amount of water is not sufficient even to settle the dust in summer or cause an appreciable ice coating in winter, and its effect, so far as the track structure is concerned, may be considered negligible. Where there are long steel bridges it is a good idea to prohibit blowing down while cross-

ing these structures, because the discharge of hot water may have a tendency to destroy or damage the paint film.

For yard switch engines, a type of centrifugal muffler has been found desirable. This device separates the vapor from the water and the latter is discharged slowly to the roadbed in a manner which does not wash sufficiently to create holes in the ballast.

No Proof of Damage

By R. N. Foster
Water Engineer, Wabash, Decatur, Ill.

While we have made no specific tests, observation on our own line and information obtained from other lines which follow the practice of blowing down locomotive boilers out on the road have failed to disclose any undesirable effect on the ties or other parts of the track structure, except too much wetting of the ballast where the ballast section is slack or not properly drained. The most probable adverse effects of blowing down boilers would naturally be assumed to result from the temperature of the blow-down water as it strikes the roadbed and from the salts released with the blow-off. Tests have shown, however, that in the summer the temperature of the blow-down water is only slightly above that of the atmosphere. Rapid evaporation usually reduces this temperature until almost immediately after the water is deposited it is below that of the atmosphere. So far as the salts are concerned, it appears that they have a slight preservative effect instead of an adverse one.

Should Joints Be "Cocked"?

When picking up joints and smoothing track, is it good practice to raise the joint higher than the remainder of the rail? Why? If so, how much?

Many Factors Involved

By W. H. Sparks
General Inspector of Track, Chesapeake & Ohio, Russell, Ky.

So many factors are involved that one cannot give an answer to this question that will apply to all cases. These involve the rail, the joint fastenings, the ballast, the roadbed, the drainage, the character and density of the traffic, the speed of trains and the method of tamping, that is whether by hand or by power tamping. In fact, the section foreman, above all others, should be best qualified to say whether the joints on a particular stretch of track should be brought to true surface or raised slightly above it.

A few general principles can be laid down, however, which will cover the general run of track conditions. If the rail is in good condition and the ballast clean and of ample depth, it should not be necessary to cock the joints. On the other hand, if the rail is worn or the ballast does not have first-class supporting power, a slight lift above the true surface may be desirable. This may also be desirable if the ballast is coarse and the tamping is done by hand, since settlement is likely to occur under the first few trains. Again, on soft roadbed it is almost always desirable to lift the joints slightly more than the remainder of the rail, even when the rail is new.

Two things should be kept in mind definitely: (1) That cocking the joints does not cure or improve battered joints; and (2) that when we speak of raising the joints above the remainder of the rail we are speaking in terms of, say, ⅛ in., although on a soft roadbed or in dirty ballast as much as ¼ to ⅜ in. may sometimes be desirable.

Not Too High

By Thomas Walker
Roadmaster, Louisville & Nashville, Evansville, Ind.

If the work is handled intelligently and the raising is not overdone, it is good practice in some cases to raise the joint higher than the remainder of the rail when picking up joints and smoothing track. This will depend, however, upon the kind and condition of the ballast, the condition of the joint, the age of the rail, etc. The main point is that one should not raise the joint too high or tamp too far on each side of it, since this will result in humped shoulders.

When hand tamping a low joint, the tamping under the joint, provided the remainder of the rail is not tamped, can seldom be made as compact as the old bed under the remainder of the ties, and the joint will invariably settle some under traffic. It requires good judgment to allow for such settlement and it should not be overdone. Usually ¼ in. to ⅜ in. is ample, but in some cases this can be increased. A foreman should always take the safe course and avoid getting the joint too high since it might not settle enough and thus remain high permanently.

Foreman Knows Best

By Henry Becker
Section Foreman, St. Louis-San Francisco, Rush Tower, Mo.

This is a question which the section foreman can answer better than anyone else. He has, or should have, an intimate knowledge of the conditions on his section and should know how his track may be expected to act under all circumstances.

If the rail is in good condition, the ballast clean and well compacted and the roadbed solid and well drained, there is usually little reason for raising the joints higher than the remainder of the rail. On the other hand, in some kinds of ballast, even though it be clean and well drained, they may be put up a little stiff, but only enough so that the first train or two will settle them to a smooth surface. If the roadbed is soft, it will be of advantage to make a fairly stiff raise at the joint, since it may be expected to settle within a short time. In this case, in getting its settlement it will compact the ballast enough so that it will not be necessary to raise it so frequently.

There are many gradations between these two extremes, which might be discussed in general terms, but when it comes to the practical application in any given case, it is only the section foreman who has observed conditions day in and day out over a period of years who is best fitted to say whether the joints should be raised stiff and, if so, how much.

Should Be Level

By Robert White
Extra Foreman, Grand Trunk Western, Pontiac, Mich.

Joints should never be "cocked" but should be level with the surface of the remainder of the rail. In the first place, trains will roll just as bad when traveling over high joints as over low joints. It is true that in time high joints will be pounded down, but it is my observation that they will become low more quickly

than if raised only to true surface, and the track does not ride smoothly either before or after it is lifted.

Every experienced trackman knows that track that is out of level is not good-riding track, and track with cocked joints is always out of level. In fact it rides worse where the joints are high than where they are low. Where they are low there may be a perceptible drop, but where they are high there seems to be a continuous roll.

Lifting a battered joint higher than the general surface will not eliminate the batter. In time, however, it will cause the shoulder ties to become high, and the track will be worse than it was before the joint was lifted. Tamping the two or three ties at the joint higher than the general surface also causes "jumpy" track, although lifting them ⅛ to ¼ in. over newly-filled pipe trenches will help to settle the subgrade. To do this is also helpful at times where the joint is just off of a bridge. I want to emphasize, however, that in general, joints should be raised only to the same elevation as the remainder of the rail.

Significance of a Broken Cap

What does a broken cap in a pile bent indicate? A split cap? What remedy should be applied?

Settling Piles

By L. G. Byrd
Supervisor Bridges and Buildings, Missouri Pacific, Poplar Bluff, Mo.

Broken caps in pile bents can almost invariably be traced to insufficient penetration of one or more piles in the bent. In the great majority of cases it is the interior piles that lack penetration, with the result that they settle and throw an undue part of the load on the outside batter piles, in which event the cap is almost certain to break. Formerly, it was a general practice to drive piles of the same length in individual bents and to select the largest piles for the batter piles. As a result, in many cases the quarter or inside piles did not receive the proper penetration. Furthermore, when settlement occurs it is usually the small piles that are involved.

To eliminate broken caps it is worth while to drive the inside piles first, making certain that they have sufficient penetration or are driven to refusal. When this is done, the earth will be compacted more thoroughly around these piles, thus increasing skin friction and thereby reducing the tendency to settle. If test piles are driven in advance, piles of the correct length can be ordered for each bent and the chance of settlement largely eliminated. Where there is no settlement in the piles there will be no broken caps.

Split caps are usually due to the kind of material used. Oak is more subject to splitting than either pine or Douglas fir. Splits usually develop in caps after they have been in service for some time, and usually result from the drying out of the wood. It has been noted that in former years enough care was not always exercised to secure an even bearing on the tops of piles, for which reason the load was sometimes thrown on one edge of the cap, which split as a result.

Seasoning splits can be reduced or eliminated by means of the bolts in the braces at each end of the cap, provided they are kept well tightened. Anchoring the caps to the piles by means of angles applied to each pile, except the outside ones where the braces hold the pile in place, is also of assistance in overcoming split caps. These angles are standard structural sections 2 in. by 3 in. by ⅜ in. and are held by ¾-in. bolts through the cap at about its median line—approximately 7 in. from the top.

Unevenly Loaded

By James Wilson
Bridge and Building Foreman, Canadian National, Toronto, Ont.

While there are several apparent reasons why caps in pile bents break, fundamentally the one reason is that the load is not evenly distributed, or in other words the cap is not properly supported by the piles. This may be due to the fact that the piles are too far apart or that they have not been driven so that the stringers can be placed directly over them. In those cases where they are so far apart that the stringers must be placed, say, midway between the bearing points, it is good policy to put an intermediate post between the piles, so that the cap will receive the proper support.

Sometimes a cap breaks as a result of the settlement of one or more piles in the bent. In such cases, purely as a temporary measure and before the damage occurs, shims should be inserted between the top of the pile and the bottom of the cap to maintain an even bearing and an equable distribution of the load.

A split cap can often be traced to the drift bolts securing the cap to the piles, or those securing the stringers to the cap. In either case, any surge or thrust longitudinally of the bridge has a tendency to press against the drift bolt, causing it to act as a lever and start a split. There is also a possibility of starting a split when driving the drift bolts if the holes in the cap are not bored to the proper depth.

Where a split has started to develop, further progress can usually be stopped or retarded by using a bolt to hold the splitting faces tight together. To do this, the cap should be bored near the top or spreading portion and drawn together tightly by means of the bolt or bolts. The crack or split should be filled with coal tar or asphalt to prevent moisture getting to the heart of the timber and starting decay. I have known this treatment to prolong the life of a cap for several years.

Several Causes

By W. J. Howse
Bridge and Building Foreman, New Orleans & North Eastern, Poplarville, Miss.

Broken caps may be attributed to any one of several causes. Probably the most frequent cause is improper spacing of the piles in the bent, which gives an unequal distribution of the loads passing over the structure, both to the cap and the piles which support it. This condition is especially aggravated where there is excessive spacing between the batter and the plumb piles.

The splitting of caps is sometimes the result of piles having been driven out of line and afterwards forced back into line by jacking. A heavy strain is placed on such piles, and if the bracing on the bent is not of the best, the drift bolts holding the cap to the piles will receive considerable strain and likely cause the cap to split. The grade and size of timber used for caps and the number and size of the piles used in the bent all have their influence in causing or preventing these types of failure in caps.

As a remedy for such failures, I suggest that all piles be properly spaced in driving, and that care be used to drive them in line. It is also important that proper levels be maintained in cutting the piles off progressively from bent to bent. The best of material should be used for

the caps, which should not be less than 12 in. by 14 in. in section for Class A roads. Bracing is important at all times. All bents more than 4 ft. high should have sway bracing, and longitudinal and tower bracing should be applied to all bents high enough to require them.

Starting Pumps on Long Lines

What means can be employed to overcome the starting inertia of the water in a long discharge line without damage to the pump or the joints in the line? Does the type of pump or the normal pumping head make any difference?

Danger Is Real

By Water Engineer

There is a real danger of blowing out joints in a long discharge line, particularly if it has unnecessarily sharp bends in it, when starting pumps of the plunger type. Fortunately, however, the protective measures are simple and relatively cheap. The plan which I have found most effective is to place a cross connection between the discharge and suction lines to act as a by-pass when the pump is started. The by-pass should be of the same diameter, or only slightly smaller than the discharge line, and should have a gate valve.

At the moment the pump is started the gate valve should be wide open, and the water will merely circulate through the pump without building up any pressure in the discharge line. If the pump is steam driven, it should be throttled enough so that it does not race. If power driven, the power input should be limited for the same reason.

The valve should then be closed gradually and the power input increased, always exercising care not to race the pump. As the flow through the by-pass is throttled through the closing of the gate valve, pressure will begin to build up in the discharge line and the water will begin to flow.

It is important that this pressure shall not be built up too rapidly or the protective measures will be nullified. To avoid this possibility a relief valve should also be installed in the discharge line, where it will be under the observation of the operator to keep him informed whether he is closing the gate too rapidly. It will also act as a protection against excessive pressure and water hammer from the closing of valves elsewhere in the line.

The normal pumping head does not affect the desirability of providing protection against the starting inertia of the water in the discharge line. On the other hand, as the head increases the initial pressure in the line increases so that the margin between the normal working pressure and excessive pressure is less. For this reason, greater care may be necessary to insure the gradual building up of the pressure until the water is flowing at its normal velocity.

It is an inherent characteristic of the centrifugal pump that it builds up its pressure gradually, for which reason protective measures against excessive starting pressures are seldom necessary for this type.

Gradual Increase of Flow

By E. M. Grime
Engineer of Water Service, Northern Pacific, St. Paul, Minn.

This is a problem, the solution of which involves a gradually increasing flow until the pressure and velocity of the water under normal working conditions have been attained. Where a positive-acting or plunger type of pump is in service, the usual method for protection against excessive pressures is to provide a by-pass pipe line by means of which, as the pump is started, all or part of the water from the discharge side of the pump may be diverted back to the suction side.

Before starting the pump the valve in this by-pass line is opened. The pump may then be started under practically no load, since the water will simply churn around in the pump. The operator then closes the by-pass valve gradually and as this is done the pressure is built up slowly to the maximum requirement.

As an additional safety measure, a pressure-relief valve should also be placed in the discharge line near the pump. This spring-type valve is set to open at a pressure slightly above the normal working requirement. It permits water to waste automatically if the pressure is built up much above the normal working requirement. By observing its action the operator is able to determine the rate at which the by-pass valve can be closed safely. A valve of this type will also be constantly on guard to protect the pump and pipe line against sudden excessive pressure caused by the closing of valves elsewhere in the line. The greater the pumping head the more necessary are these protective arrangements.

A centrifugal pump builds up its pressure gradually, for which reason provision for a by-pass connection is not usually necessary, although in some cases it may be desirable.

Cranes for Laying Rail

What is the most economical size of crane for laying rail? Should it be full revolving?

One and One-Half Tons

By W. L. Roller
Division Engineer, Chesapeake & Ohio, Columbus, Ohio

For the economical laying of rail, a crane of 1½ tons capacity is the most satisfactory. Obviously, it should be self-propelling, and it can be powered with either gasoline or gas-electric drive. The gasoline-driven equipment is sufficiently steady and positive to handle the load safely, for which reason this type of power commends itself highly in this service. I have found the electric hoist somewhat steadier, however, and equally dependable in other ways, yet if the crane is to be used exclusively for laying rail, I can see no reason why it should be powered with the electric drive.

This low capacity, 1½ tons, has been selected so that the crane may be made as light as practicable in order that it may be easily loaded on cars, upon which it may be mounted for other uses, such as for loading and unloading rails and other materials.

A rail crane should be equipped with a boom 26 to 30 ft. long, to adapt it for picking up and laying 39-ft. rails into the track. If the rails to be handled are longer or shorter, the boom should be lengthened or shortened accordingly.

It is highly desirable that the crane be full revolving, because this greatly increases its flexibility since it can then pick up or dispose of its load

over a much greater range. Often, in the laying of rails it becomes necessary at battery-well locations to use short rails. These can be carried on push cars which are towed by the crane. Then when they are needed they can be handled by the full-revolving crane without recourse to manual labor. Another advantage of the full-revolving type of crane is its utility in handling other rail-laying equipment, such as spike pullers, adzers, etc., on and off of the track, thus saving labor and reducing the hazard of injury.

While it may sometimes be expedient to use cranes of higher capacity and greater weight, it seems to me that with the present weight and length of rails, the light 1½-ton crane is adequate and commends itself to this service by its lightness and greater mobility. Cranes for this service, as for many others, should be self propelled, and should be designed to travel at speeds up to 20 or 25 miles an hour. This will permit them to be moved reasonable distances under their own power, thus making it unnecessary to load them for shipment for short distances.

Should Be Full Revolving

By Engineer Maintenance

This question is assumed to refer to a crane used not only in the actual laying of the rail but to perform also any or all of the varied operations involved in a rail-renewal job. By this I mean that a crane which would be most economical for laying rail which had already been unloaded would not necessarily be the most economical for rail-renewal work which consists of (1) unloading the new rail, (2) laying this rail and (3) picking up the released rail.

For unloading and picking up rail, a full-revolving crane having a capacity of 4,000 lb. at 25-ft. radius, and 10,000 lb. at 12-ft. radius, is believed to be the most economical, while it will have an ample factor of safety for the handling of the rail, as well as frogs and other material involved. With a crane of this type it is possible to handle rail to or from a car at either end of the car from which the crane is being operated in the work train. Again, such a crane will be able to tow out two loaded cars for unloading, where such an operation is feasible.

Assuming that the rail has been unloaded in advance and that a crane is being considered only for the purpose of laying this rail in the track, a full-revolving crane will not be necessary. Normally, in distributing the rail it will be placed near the ends of the ties, in which case a crane with a half-circle swing, having a capacity of 3,000 lb. at 25-ft. radius, when the boom is swung out 9 ft. from the center of the track, will be ample and economical. A light crane of this type is generally faster on the swing and will lay in more rail in a given time than a heavier crane of greater capacity, and at the same time it will cost less to operate.

It is seldom, however, that a crane is purchased for handling rail exclusively. Most cranes are intended to be all-season machines, and are expected to be used in bridge and building work, for handling a wide variety of new and scrap material and with various types of buckets which are adapted for excavating, loading and unloading crushed stone, gravel and coal, and for cleaning cinder pits, sludge pits, etc., as well as for many other jobs which must be done by the forces of the maintenance and stores departments.

It follows, therefore, that a crane of the type generally used in handling rail should not be purchased solely on the basis of its potential economy in laying rail. Rather, a careful study should be made of the various operations for which it is expected that the crane will be used throughout a normal season and a machine should be selected which will give the greatest over-all economy.

How to Enforce Slow Orders

What steps should be taken to insure that permanent slow orders over bridges of limited capacity are being observed?

Check from Time to Time

By C. S. Heritage
Bridge Engineer, Kansas City Southern, Kansas City, Mo.

Where permanent slow orders are placed on bridges, or on any other section of track for that matter, observations are made by section foremen, roadmasters and other supervisory officers to note whether these orders are being observed. From time to time definite time checks are made on the speed of trains and where there is a tendency to exceed the speed limit, the matter is handled through the regular channels for correction. This is our general practice and so far we have found it to be entirely satisfactory.

Make Surprise Checks

By J. Morgan
Supervisor, Central of Georgia, Leeds, Ala.

A permanent slow order over a weak bridge is no different from any other permanent slow order, so far as getting it observed is concerned. It is my experience that the best way to get such an order observed is to place the regulation slow boards and "resume speed" boards at the proper points with respect to the restricted track or bridge. The permissible speed should be shown in easily legible figures. The restriction should be covered by a bulletin and then transferred to the time card when next issued, showing the time to be consumed in passing over the slow track, so that an engineman will not be in doubt as to the speed he is making. It is also well to make surprise checks from time to time to learn whether the restriction is being observed.

Always Difficult

By Joseph Hazelwood
Bridge Foreman, New York, Chicago, & St. Louis, Frankfort, Ind.

Anyone who puts out a permanent slow order may expect to meet some difficulties in getting it observed. Our experience has been that definite action is necessary to insure complete observance. We have followed the practice of checking the speed of trains at irregular intervals, without allowing the train and enginemen to know that we are doing so. We then report all violations of the speed restriction to the superintendent for the proper disciplinary action. This usually helps for a time, but it must be repeated eventually. The only certain way to insure complete observance is to have a watchman on the ground all of the time and advertise the fact that he is there for the purpose of checking speeds.

What Our Readers Think

Two Old Smoke Stacks

Macon, Ga.

To The Editor:

On page 229 of the April, 1935, issue there is an interesting article on The Problem of the Smoke Stack. In view of the statement in this article that "the life of a steel stack ranges from 2½ to 7 years," and that "data obtained concerning 22 steel stacks in railway service showed an average life of 5.2 years," it may be of interest to your readers to know that we have just replaced two steel stacks which were erected in 1912 as a part of the original equipment embodied in our timber creosoting plant at Macon.

These stacks were 36 in. in diameter by 60 ft. high and were made from 5 ft. sheets with riveted joints. The lower half of each stack was of No. 8 gage metal and the upper half of 10 gage. The stacks were guyed with one set of guy cables fastened to a steel ring 10 ft. below the top of the stack.

They were located directly over the boilers, which were fired with bituminous coal from the Birmingham district, the firing being continuous except at times of boiler washing and occasional repair work. They were painted at approximately four-year intervals.

The first evidence of failure in either stack was observed in 1931, at which time smoke leakage was detected at one of the horizontal seams about two-thirds of the way up on one of them. By the spring of 1932 a similar sign of failure appeared in the other stack.

Under ordinary circumstances both stacks would have been condemned and replaced as early as possible. At that time, however, the plant was operating on a sharply reduced schedule and for economic reasons it was desired to defer the replacement, but to do so it became necessary to develop some means to keep the stacks safe.

This was accomplished by reinforcing the weak place in each stack with a sheet-metal sleeve having an internal diameter the same as that of the outside of the stack. The sleeve was equipped with four pairs of small angles riveted to the sleeve and drilled for ⅜-in. bolts, for the purpose of drawing the sleeve together after it was in place. The sleeves were lifted into position by a locomotive crane. A man on the end of the boom spread them enough to slip them over the stacks and then bolted them tightly in place.

This method of reinforcing proved to be so satisfactory that during the three years following, an additional 5-ft. sleeve and one of 2½ ft. were applied to each stack as other weak spots developed.

By the end of 1935, however, still other weak spots became apparent, and it was decided to postpone the renewal no longer. New stacks of wrought iron were constructed in the company's shop at Macon, and were erected by company forces, using a locomotive crane, on May 9, 1936. No major difficulties were encountered in taking down the old stacks or in erecting the new ones. The first of the old stacks was lifted out in one piece, but as a precaution against collapse, the other one was cut in two and removed in sections.

The method of reinforcing and prolonging the life of stacks which has been described is not recommended, except under extreme circumstances, because while these stacks withstood successfully two 40-mile gales this spring, which proved their strength up to the last, there was no practical way of determining in advance just how much of a factor of safety, if any, they possessed.

If the stacks had been replaced when they first showed signs of advanced deterioration, they would have had a service life of 19 years to their credit, which evidently is an unusual life. As it was, when they were finally replaced, this service life had been extended to 24 years.

L. H. Harper,
Superintendent, Creosote Plant,
Central of Georgia.

New Books

Welding Specifications

Specifications for Design, Construction, Alteration and Repair of Bridges by Fusion Welding, prepared under the auspices of the American Welding Society. 6 in. by 9 in., 66 pages, illustrated. Bound in cardboard. Published by the society, 33 West Thirty-ninth street, New York. Price $1.

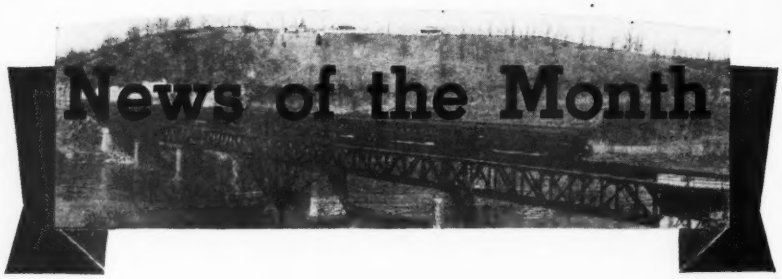
This treatise represents the results of two years' work by a committee of 27 engineers representative of practically every leading interest concerned with the application of fusion welding to steel structures, and included P. G. Lang, Jr., engineer of bridges of the Baltimore & Ohio, chairman, and three other railway bridge engineers. While the work is in no sense a text book, it is more than a mere specification, for the mandatory clauses are supplemented by a five page foreward in which the committee has presented its views on the limitations of welding and on some of the broader phases of the responsibilities imposed on those who apply this new process. There is also an appendix of supporting data relating to the unit stresses for welded design, including a bibliography on the subject. The specifications embrace design, material and workmanship, and include special sections devoted to the technic of electric-arc and gas welding.

Among the appendices is one on the society's Proposed Code for Qualification of Welding Processes and Operators.

Water Treatment

BOILER Feed Water Treatment, by F. J. Mathews. 256 pages, 6 in. by 9 in. Bound in cloth. Published by Chemical Publishing Company, 148 Lafayette street, New York. Price $5.

WATER treatment is a large subject, and in selecting the material that could be embraced within a book of 256 pages, the author has confined his attention to an explanation of the chemical and physical significance of the various processes and reagents employed. The book is, therefore, of value primarily to the man who desires to improve his knowledge of the basic principles in this entire field. The exposition is clear, and while it implies some knowledge of chemistry, the text matter is designed primarily for the engineer. The text is presented under four main headings—scale formation, corrosion, priming and foaming, an analysis and routine testing. Each section embraces the field as a whole, without any attempt at a discussion of the peculiar problems of the stationary power plant on the one hand or those of the locomotive on the other.



Railroads Report Increased Revenues

An increase of 20.2 per cent in passenger revenues in July as compared with July, 1935, is shown for 26 of the 53 Class I railroads in the eastern district in a summary of estimates of operating revenues issued by the Interstate Commerce Commission. The same roads showed an increase of 29.3 per cent in freight revenues. For the first five months of the year, before passenger fares in the east were reduced, the eastern roads had shown an increase of 10 per cent in passenger revenues. In the southern region 17 out of 28 railroads represented reported an increase of 29.6 per cent in passenger revenues and 24.1 per cent in freight revenues, while business on 29 out of 59 western roads showed an increase of 28.1 per cent for both freight and passenger revenues.

Rail Employment in July Shows Increase

As of the middle of July the Class I railways of the United States had 1,084,836 employees on their payrolls, an increase of 66,406, or 6.52 per cent, as compared with July, 1935, according to the preliminary report on railway employment of the Bureau of Statistics of the Interstate Commerce Commission. As compared with June, 1936, employment on the railroads in July showed an increase of .74 per cent. During July, 293,609 persons were employed in the maintenance of way and structures departments of the railroads, an increase of 4.98 per cent as compared with July, 1935. This was the largest percentage increase shown by any classification except the train and engine service group, which showed an increase of 10.20 per cent.

Streamliners Have New Type Telephones

A new type of telephone system, which provides communication between a trainman at any of three stations and the engineman, is a feature of the newest streamline trains of the Union Pacific—the City of Los Angeles, the City of San Francisco and both units of the City of Denver. Unlike the ordinary type of telephone system, the system in use in these trains requires no external source of electrical energy for voice transmission, the human voice itself furnishing the necessary power for that purpose. The telephone system in each of the trains consists of four telephones—one in the front engine cab, another in the second power car, a third in the front baggage section and the fourth in the buffet coach. The system is used for train crew communication only.

Tells Railroad Story in Ten-Cent Book

A book telling the story of the railroads, which is printed in large type and contains many color illustrations, has been prepared by Col. Robert Henry, head of the publicity organization of the Association of American Railroads, and has been placed on sale for ten cents in five and ten cent stores throughout the country. Illustrations are in part photographs and in part reproductions in color of water color paintings by Otto Kuhler, artist and industrial designer, who has specialized on railroad subjects. The interior workings of the railroads are introduced in the text by telling what has to be done to prepare a train before the conductor is ready to say "all aboard" at the initial terminal. The work of important employees is described, as is the preparation of food and sleeping arrangements on trains. Modern improvements in equipment, speed and safety are outlined and engineering and maintenance methods are described.

Railroads Move Heavy Wheat Crop Without Delay

Through the co-operative efforts of the railroads, the grain elevators, and the flour and feed mills, the carriers this year handled without car shortage or delay the heaviest crop of wheat from the southwestern states for any year since 1931, according to a statement issued recently by J. J. Pelley, president of the Association of American Railroads. In the winter wheat states of Nebraska, Kansas, Oklahoma and Texas, the crop this year was approximately 50 per cent above 1935. In accordance with plans prepared by the Car Service division of the A.A.R. the supply of box cars required to meet the wheat movement was built up on western railroads at the rate of about 2,000 cars a week from May 15 to June 30. In order to accomplish this, eastern and southern railroads returned weekly a definite number of western-owned box cars to their home lines in excess of the number which would be returned in the regular course of business. In addition, the eastern and southern roads also dispatched to the west a large number of their own box cars suitable for grain loading. Several thousand cars were also transferred from the yards of terminal companies at Chicago, St. Louis and other middle western points to western lines serving the winter wheat territory.

Wallace Discusses Railroad Research

"The railroad industry stands on the threshold of one of the most active and fruitful eras of its history," said L. W. Wallace, director of the Division of Equipment Research of the Association of American Railroads, in a recent statement. Mr. Wallace asserted that through the network of relationship built up around the transportation system of the United States, a very large research personnel is working directly and indirectly in behalf of the railroad industry. "These many relationships," he continued, "mean that of the hundreds of millions of dollars spent annually for research by such industries as the steel, chemical, electric, textile, railway supply, and others, a measurable amount is spent directly in response to the manifold needs of the railroad industry."

Steam Turbine Electric Locomotive for Union Pacific

A steam turbine electric locomotive, which will be the first locomotive of this type to be operated on an American railroad, is to be constructed by the Union Pacific and the General Electric Company. The locomotive will consist of two 2,500-hp. self-contained units, which can be operated individually or in synchronization and will be capable of a maximum speed of 110 m.p.h. with a trailing load of 1,000 tons. Delivery is expected early in 1937. The steam turbine of each unit will be connected directly to a large 3-phase, 60-cycle, 220-volt generator, which will provide electricity for the six traction motors, one of which will be mounted on the axle of each pair of the six driving wheels on each unit of the new locomotive.

Features Flat Wheel Treads in Advertisements

The Chicago, North Shore & Milwaukee, which somewhat more than a year ago adopted flat (cylindrical) treads as standard on the wheels of its passenger equipment for the purpose of preventing "shimmying" at high speeds, is now featuring this innovation in newspaper advertisements calling attention to the comforts of its service. The flat treads were adopted as standard by this company when it was found that their use eliminated the vibration of the equipment that was experienced at high speeds when the cars were equipped with wheels with tapered treads. One of the advertisements featuring the flat treads included sketch drawings of two wheels, one with a tapered tread and the other with a flat tread, which were labeled the "old way" and the "North Shore way," respectively. In the same advertisement the attention of the reader is called to the fact that "new non-sway safety wheels bring amazing comfort at high speed."

Association News

International Railway Maintenance Club

On August 13, there was a meeting of the Club at the Hotel Royal Conneaught, Hamilton, Ontario. Following luncheon at 12:30 p.m., the club was addressed by T. A. Saunders, assistant division engineer, Canadian National, on "Continuous Butt-Welded Track Construction."

Wood Preservers Association

The proceedings of the thirty-second annual meeting, held in Memphis, Tenn., on January 28-30, have come from the press and are now being distributed to the members.

Plans are being made for a meeting of the executive committee in Chicago early in October, at which the program for the next annual convention will be drafted.

Track Supply Association

In addition to the 59 companies which were listed in the August issue as having arranged to participate in the exhibit of the Track Supply Association coincident with the convention of the Roadmasters and Maintenance of Way Association at the Hotel Stevens, Chicago, on September 15-17, two additional companies have since arranged for space as follows:

S. E. Rawls Company, Streator, Ill.

Railway Purchases and Stores, Chicago.

Railway Tie Association

Roy M. Edmonds has been reappointed secretary and treasurer of the Railway Tie Association, succeeding I. C. Rowe, resigned. Mr. Edmonds was connected with the association previously for six years as executive secretary and then served as secretary and treasurer for four years, which positions he resigned on December 1, 1933. Mr. Edmonds will also be editor of the Crosstie Bulletin. He will maintain offices at 1438 Syndicate Trust Building, St. Louis, Mo.

Bridge and Building Supply Men's Association

Although application blanks have been in the mail only a couple weeks, 15 companies have already arranged to participate in the exhibit of the Bridge and Building Supply Men's Association which will be presented at the Hotel Stevens, Chicago, on October 20-22, coincident with the convention of the American Railway Bridge and Building Association. Applications should be addressed to W. S. Carlisle, secretary of this organization, National Lead Company, Chicago.

The following is a list of companies that have arranged to date for participation in this exhibit:

Arrow Tools, Inc., Chicago
Barrett Company, New York
Dearborn Chemical Company, Chicago
Detroit Graphite Company, Detroit, Mich.
Paul Dickinson, Inc., Chicago
Fairmont Railway Motors, Inc., Fairmont, Minn.
Ingot Iron Railway Products Company, Middletown, Ohio
Johns-Manville Sales Corporation, New York
Koppers Products Co., Pittsburgh, Pa.
The Lehon Company, Chicago
Modern Supply Company, Chicago
National Lead Company, New York
Otley Paint Manufacturing Company, Chicago
Ruberoid Company, New York

Roadmasters Association

The program for the convention of the Roadmasters Association is now complete and all indications point to a large attendance. In addition to the program published in the August issue, W. F. Thiehoff, retired general manager of the C.B. & Q., will address the convention on Tuesday afternoon on "Building a Maintenance Organization," while John Foley, forester, Pennsylvania railroad and chairman, Tie committee, A.R.E.A., will address the convention on Wednesday morning on "Getting the Most From Crossties."

American Railway Engineering Association

The proceedings of the convention held on March 10-12 are now being bound and will be mailed to the members early in September. The members will also soon receive copies of a bulletin containing a monograph on Railway Car Ferries, by E. E. R. Tratman, consulting engineer. The manuscript for the revised manual has been completed except for the consolidated index, and contracts have been awarded for the looseleaf binders and for the printing. Distribution of some of the association's work is being carried out also under the auspices of the Weighing committee, Traffic department, of the Association of American Railroads, which is publishing 5,000 copies of a pamphlet containing the association's specifications for various types of scales and other matter relating to the maintenance, installation, and testing of scales.

Assurance that research in problems relating to the fixed properties of the railways will soon be conducted on a thoroughly organized basis is afforded by recent action taken by the board of direction, which has developed a plan for this work that recently received the approval of the Engineering division of the A.A.R. and is now in the hands of J. M. Symes, vice-president, operating and maintenance department of the A.A.R. pending its submission to the board of directors of that organization.

As the result of a meeting of the Committee on Records and Accounts at Boston, Mass., on August 6, with E. H. Bunnell, vice-president (finance, accounting, taxation and valuation) Association of American Railroads, the committee will function as a "Committee on Valuation" for the Finance, Accounting, Taxation and Valuation department of the A.A.R. In addition to this committee, meetings were held during August by the Committee on Masonry, at Harrisburg, Pa., on August 6 and 7, and by the Committee on Waterproofing, at Chicago, on August 13 and 14.

Four committees have scheduled meetings at Chicago during the week of the Roadmaster's convention to afford members an opportunity to visit the exhibit of the Track Supply Association, these committees and the dates of their meetings being as follows: Rail, September 16; Economies of Railway Labor, September 17; Maintenance of Way Work Equipment, September 15 and 16; and Track, September 16.

Bridge and Building Association

The program for the forty-third annual convention, which will be held at the Hotel Stevens, Chicago, on October 20-22, is now practically completed. The program follows:

Tuesday, October 20

Morning Session

Convention called to order
Invocation
Address by Harry G. Taylor, chairman, Western Association of Railway Executives, Chicago.
Greetings from the American Railway Engineering Association
Greetings from Roadmasters Association
Address by President T. H. Strate, division engineer, C.M.St.P. & P., Chicago
Report of Committee on Protecting Steel Bridges Against Brine Drippings—B. R. Meyers, chairman; assistant general bridge inspector, C. & N.W., Chicago.

Afternoon Session

Report of Committee on the Relative Merits of Different Species of Wood for Timber Bridges—George S. Crites, chairman; division engineer, B. & O., Punxsutawney, Pa.
Address on Termites in Railway Structures, by Harry R. Duncan, superintendent of timber preservation, C.B. & Q., Galesburg, Ill.
Report of Committee on Recent Developments in Preframing Timber Bridges—O. W. Stephens, chairman; bridge and building supervisor, D. & H., Green Island, N.Y.

Evening Session

Illustrated address on Recent Trends in Railway-Highway Grade Separation Structures, by Thomas H. McDonald, director, U.S. Bureau of Public Roads, Washington, D.C.

Wednesday, October 21

Morning Session

Report of Committee on the Maintenance of Railway Roofs—John S. Hancock, chairman; bridge engineer, D.T. & I., Dearborn, Mich.
Address on Recent Developments in Paint for Building and Structural Uses, by F. L. Browne, senior chemist, Forest Products Laboratory, Madison, Wis.

Report of Committee on the Inspection and Maintenance of Water Tanks—R. E. Dove, chairman; assistant engineer, C.M.St.P. & P., Chicago

Afternoon Session

Report of Committee on Adapting Bridge Maintenance Methods to Today's Requirements for High-Speed Trains—George E. Boyd, chairman; associate editor, *Railway Engineering and Maintenance*, Chicago

Address on Meeting Specific Problems in Bridge Design, by R. P. Hart, assistant bridge engineer, Mo. Pac., St. Louis, Mo.

Report of Committee on Rebuilding Our Bridge and Building Organization to Meet the Demands of the Recovery Period—W. B. Mackenzie, chairman; assistant bridge engineer, St. L.-S.F., Springfield, Mo.

Round table discussion of questions submitted by members

Thursday, October 22

Morning Session

Report of Committee on Underwater Repairs to Piers and Abutments—E. C. Neville, chairman; bridge and building master, C.N.R., Toronto, Ont.

Closing business

On Thursday afternoon, those members of the association who are in railway service will visit the plant of the Johns-Manville Corporation at Waukegan, Ill., where they will be afforded an opportunity to observe the manufacture of asbestos shingles, smoke jacks, water pipe, etc., returning to Chicago about 5 p.m.

Business Opposes Government Ownership

American business is overwhelmingly opposed to government ownership and operation of the railroads, according to a poll of national, regional, state and local business organizations just completed by the Transportation Conference. The report of the poll is incorporated in a volume of 740 pages, which contain photographic reproductions of declarations on the subject by 666 business organizations. A total of 633 organizations strongly endorsed the continuation of private ownership. One favored government ownership, while other organizations did not take formal action.

Among the major reasons which the resolutions raise against government control of rail transport are: The undesirability of the government operating business which can better be carried on by private enterprise, the vast possibilities of extending government bureaucracy with political manipulation of railroads and their employees under government ownership, the highly unsatisfactory experience with government ownership and operation of the railroads during the World War, danger of political favoritism in service and rates, the enormous increase in the public debt which would be required by the government acquisition of the railroads, and the tremendous loss in railroad tax money to the state, county and municipal governments now paid to them upon privately-owned railroad property.

Personal Mention

General

T. A. Blair, division engineer of the Slaton division of the Panhandle & Santa Fe, has been appointed trainmaster on the same division, with headquarters as before at Slaton, Tex.

G. M. Cornell, assistant cost engineer on the Chesapeake & Ohio, with headquarters at Richmond, Va., has been appointed transportation inspector in the office of the general superintendent, with headquarters at Huntington, W.Va.

Walter O. Frame, district maintenance engineer of the Central district of the Chicago, Burlington & Quincy, who has been appointed assistant superintendent at Wymore, Neb., as reported in the August issue, was born on October 27, 1890, at Osceola, Iowa. Mr. Frame first entered railway service in 1905 in the track department of the Burlington at

Walter O. Frame

Osceola, serving successively as a section foreman, extra gang foreman, and as foreman in charge of construction until 1911, when he was made construction roadmaster on grade reduction work for the Kansas City Terminal. Two years later he went with the Chicago, Rock Island & Pacific as an extra gang foreman, returning to the Burlington in 1914 as an extra gang foreman on the St. Joseph division. In 1916 Mr. Frame was advanced to roadmaster on the Hannibal division, and from 1918 to 1921 he served as roadmaster and assistant trainmaster on the Aurora division. At the end of this period he was made inspector of maintenance of way on the staff of the general manager of the Lines East of the Missouri river, then being assigned to the Beardstown division, where he served as trainmaster and roadmaster until 1927. In March of that year he was appointed engineer maintenance of way of the Illinois district, being transferred to the Iowa district in August, 1927, and the Central district in October, 1931. He was located on the latter district at the time of his recent appointment as assistant superintendent at Wymore.

John Edwards, Jr., division engineer of the Monongah division of the Baltimore & Ohio, with headquarters at Grafton, W. Va., has been promoted to assistant superintendent of the Baltimore division, at Baltimore, Md., succeeding **H. F. Wyatt.** Mr. Edwards was born on December 4, 1889, at Mason City, W. Va. He entered railway service with the Baltimore & Ohio on July 1, 1911, as a timekeeper and rodman on the engineering corps and continued on the corps until November, 1913, when he became a surveyor in the United States Forest Service. In January, 1915, he became a junior civil engineer with the Interstate Commerce Commission. In May, 1915, he returned to the B. & O. as a transitman and in May, 1917, was promoted to assistant track supervisor. In July of that year he was promoted to assistant division engineer. He entered military service later in the same month as a second lieutenant with the 77th division, 32nd Engineers, and was discharged as captain of the 32nd Engineers, A.E.F., in July, 1919. He returned shortly to the B. & O. as assistant division engineer, and in May, 1925, was promoted to assistant engineer maintenance of way and structures. On August 1, 1929, he was appointed division engineer on the Monongah division, which position he was holding at the time of his recent promotion to assistant superintendent.

Edward A. Whitman, chief engineer of the Minneapolis, St. Paul & Sault Ste. Marie and the Duluth, South Shore & Atlantic, with headquarters at Minneapolis, Minn., has been promoted to general manager of the Soo Line and vice-president of the D.S.S. & A. Since early in June Mr. Whitman has held the position of acting general manager of the Soo Line. He was born on April 16, 1877, at Granite Falls, Minn., and obtained his higher education at the University of Minnesota, being graduated from the College of Engineering in 1899. In May of the same year, Mr. Whitman entered railway service with the Bismarck, Washburn & Great Falls (now part of the Soo Line). On January 10, 1907, he was made an assistant engineer on the Soo Line, being advanced to valuation engineer on September 27, 1913. Three years later he was further promoted to assistant chief engineer and on July 1, 1917, he was made chief engineer, being appointed also to the same position on the D.S.S. & A. a short time later. On June 6, 1936, he was made acting general manager of the Soo Line and vice-president of the D.S.S. & A. His appointment as general manager of the Soo Line became effective on August 1.

Engineering

M. F. Temple, principal assistant engineer of the Gulf, Colorado & Santa Fe, with headquarters at Galveston, Tex., retired from active service on August 1. **G. L. Marick,** assistant office engineer of the G. C. & S. F. at Galveston, has been promoted to office engineer, succeeding

J. L. Starkie, whose appointment as district engineer of the Eastern district of the Eastern lines of the Atchison, Topeka & Santa Fe (parent company of the G. C. & S. F.) is noted elsewhere in these columns.

H. E. Kirby, assistant cost engineer on the Chesapeake & Ohio, with headquarters at Richmond, Va., has been appointed assistant engineer in charge of the road's system bolt tightening and lag screw organizations, with headquarters, as before, at Richmond.

J. B. Raymond, roadmaster on the Panhandle & Santa Fe, with headquarters at Amarillo, Tex., has been promoted to division engineer with headquarters at Slaton, Tex., to succeed **T. A. Blair,** whose appointment as trainmaster is noted elsewhere in these columns.

Mason Rector, an assistant engineer on the Chicago, Rock Island & Pacific, has been appointed temporary division engineer on the Oklahoma division, with headquarters at El Reno, Okla., succeeding **C. A. Richards,** who has been granted a leave of absence.

H. L. Exley, who has been connected with the staff of the engineer maintenance of way of the Baltimore & Ohio, at Baltimore, Md., has been appointed division engineer of the Monongah division, with headquarters at Grafton, W. Va., succeeding **John Edwards, Jr.,** whose promotion to assistant superintendent is noted elsewhere in these columns.

William H. Hillis, who has been appointed engineer maintenance of way of the Chicago, Rock Island & Pacific, with headquarters at Chicago, as announced in the August issue, was born at Colona, Ill., on March 31, 1886. At the time of this appointment Mr. Hillis had been in

William H. Hillis

the service of the Chicago, Burlington & Quincy for more than 30 years. He first entered the service of that company as a rodman at Beardstown, Ill., on January 1, 1906, serving in various capacities in the engineering department until August 15, 1911, when he was appointed roadmaster. During the following five years he served in the latter position on various divisions, then being transferred to the operating department as trainmaster on the Aurora division. In 1925 Mr. Hillis was appointed district engineer of maintenance of the Illinois district with headquarters at Galesburg, Ill., and in October, 1927, he was advanced to assistant superintendent of the La Crosse division. Three years later he was transferred to the Galesburg division, and on December 15, 1931, he was sent to Texas where, as superintendent of construction, he had charge of the construction of a 110-mile line between Childress, Tex., and Pampa. Following the completion of this work Mr. Hillis returned to the La Crosse division as assistant superintendent, which position he was holding at the time of his recent appointment as engineer maintenance of way of the Rock Island.

John L. Starkie, who has been appointed district engineer of the Eastern district of the Eastern lines of the Atchison, Topeka & Santa Fe, as reported in the August issue, has been connected with the Santa Fe and affiliated lines for more than 30 years. He was born on October 27, 1883, at Worcester, Mass., and graduated from the University of

John L. Starkie

Kansas in 1905. Immediately thereafter, Mr. Starkie entered railway service with the Kansas City, Mexico & Orient (now part of the Atchison, Topeka & Santa Fe), where he served as a chainman, rodman and instrumentman on the construction of lines in Kansas, Oklahoma, Texas and Mexico. In May, 1909, Mr. Starkie was promoted to resident engineer, in which capacity he divided his time between maintenance and construction work. In December, 1913, he left the Orient to become a draftsman on the Gulf, Colorado & Santa Fe at Galveston, where he was advanced to office engineer in April, 1914. During federal control of the railroads, Mr. Starkie served as office engineer until August, 1918, when he was appointed assistant chief engineer of Group VI of the Southwestern region, with headquarters at Dallas, Tex., returning to the position of office engineer on the G.C. & S.F. at Galveston in October, 1919. In July, 1924, he was appointed manager and operator of the railroad's ballast plant at Brownwood, Tex., which position he retained until 1930, when he was appointed division engineer at Temple, Tex. In 1931 Mr. Starkie returned to the position of office engineer at Galveston, where he remained until his recent appointment as district engineer at Topeka.

H. A. Lynch, whose promotion to division engineer of the Baltimore & Ohio, with headquarters at Connellsville, Pa., was announced in the July issue, was born on December 5, 1889, at Walton, W. Va. He received his higher education at the college of Engineering, Ohio State

H. A. Lynch

University, being graduated in 1911. On August 15 of that year he entered railway service as a rodman on the Chicago division of the B. & O., with headquarters at Garrett, Ind., and on January 1, 1912, was transferred to the Chicago Terminal, with headquarters at Chicago. In May of that year he returned to Garrett, and on October 15, was appointed chainman on the Chicago Terminal. On April 1, 1913, he was promoted to transitman with the same headquarters, and on April 16, 1916, he was further promoted to assistant track supervisor on the Cumberland division, with headquarters at Hancock, W. Va. On November 28 of that year he was transferred to the Pittsburgh division, with headquarters at West Newton, Pa., and on May 29, 1918, was promoted to assistant division engineer on the Cumberland division, with headquarters at Cumberland, Md. He served in this capacity at various headquarters until May 1, 1932, when he was appointed track supervisor on the Wheeling division, with headquarters at Wheeling, W. Va. On December 1, 1935, he was appointed assistant division engineer on the Pittsburgh division, with headquarters at Connellsville, Pa., where he was located at the time of his recent promotion to division engineer.

W. E. Heimerdinger, who has been appointed district maintenance engineer of the second district of the Chicago, Rock Island & Pacific at Kansas City, Mo., as announced in the August issue, has been connected with the Rock Island for about 25 years. He was born on February 12, 1889, at Vulcan, Mich., and received his higher education at the University of Michigan, Ann Arbor. He entered the service of the Rock Island in September, 1911, and served successively at various points as an assistant on the engineering corps, inspector, instrumentman, roadmaster, assistant engineer, and office engineer.

In 1922 he served as resident engineer on the construction of the Rock Island terminals in Omaha, Neb., and in 1924 and 1925, he was locating engineer in charge of surveying the line from Trenton, Mo., to Kansas City. Appointed division engineer on March 1, 1923, Mr. Heimerdinger has held that position at Des Moines, Iowa, Trenton and Cedar Rapids, Iowa, being located at the later point at the time of his recent appointment as district maintenance engineer of the Second district of Kansas City.

W. E. Heimerdinger

Thomas Z. Krumm, principal assistant engineer of the Minneapolis, St. Paul & Sault Ste. Marie, has been promoted to chief engineer of the Soo Line and of the Duluth, South Shore & Atlantic, with headquarters as before at Minneapolis, Minn. In both capacities Mr. Krumm succeeds **Edward A. Whitman,** whose appointment as general manager of the Soo Line and vice-president of the D.S.S. & A. is noted elsewhere in these columns. Mr. Krumm was born on July 20, 1882, at Columbus, Ohio. Graduating from Ohio State university in 1902, Mr. Krumm entered the service of the Chicago Great Western in the same year as a resident engineer. From April, 1905, to August, 1915, he was connected with the Northern Pacific as a locating engineer and assistant engineer on construction, then going with the Chesapeake & Ohio Northern (part of the Chesapeake & Ohio) as a resident engineer on construction. During the World War he served with the United States Army as captain of engineers, returning to railway service in August, 1919, in the valuation department of the Northern Pacific. In May, 1920, he entered the service of the Soo Line as principal assistant engineer, which position he held continuously until his recent appointment as chief engineer of this company and of the Duluth, South Shore & Atlantic.

Track

A. Eremko, section foreman on the Canadian Pacific, with headquarters at Yorkton, Sask., has been appointed acting roadmaster on the Saskatoon division, with headquarters at Wadena, Sask., succeeding **A. Campbell,** who has been transferred to Saskatoon, Sask., on the same division, where he replaces **A. K. Rois,** who has been transferred to Swift Current, Sask.

D. Cameron roadmaster on the Canadian National at Biggar, Sask., has been transferred to the Prince Albert division, with headquarters at Melfort, Sask. The position of roadmaster at Melfort is a newly created one.

G. L. Moody has been appointed roadmaster on the Missouri-Kansas-Texas, with headquarters at Parsons, Kan., to succeed **Andrew Mahoney,** roadmaster, with headquarters at Coffeyville, Kan., whose death is noted elsewhere in these columns.

A. B. Harrison has been appointed roadmaster on the Chicago, Rock Island & Pacific, with headquarters at Ft. Worth, Tex., to succeed **C. S. Diltz,** who has been granted a leave of absence. **P. I. Buser,** roadmaster at Iowa Falls, Iowa, has been transferred to Sibley, Iowa.

George H. Symmonds, an extra gang foreman on the Atchison, Topeka & Santa Fe, has been promoted to roadmaster, with headquarters at Joliet, Ill., to succeed **Tom Thompson,** whose death on July 5 was noted in the August issue. Mr. Symmonds was born on October 7, 1900, at Memphis, Mo., and entered railway service with the Santa Fe on April 20, 1919, as a track laborer. On April 15, 1922, he was advanced to assistant section foreman and on August 14 of the same year he was further promoted to section foreman. In May, 1923, Mr. Symmonds was made an extra gang foreman, which position he was holding at the time of his recent appointment as roadmaster, with headquarters at Joliet, which was effective on July 1.

Paul M. Loftus, whose appointment as roadmaster on the Chicago, Milwaukee, St. Paul & Pacific, with headquarters at Janesville, Wis., was reported in the August issue, was born on April 17, 1906, at Tioga, Iowa. Mr. Loftus obtained his first railway experience during the summer of 1919 when he worked as a section laborer on the Chicago, Rock Island & Pacific. He entered the service of the Milwaukee on March 3, 1923, as an extra gang laborer, being advanced to assistant foreman on rail-laying work on May 1, 1925. On September 15 of the same year he was advanced to foreman of a rail-laying gang and subsequently had charge of ballasting gangs and tie gangs as well as rail-laying work. At the time of his recent appointment as roadmaster, which took place on June 27, Mr. Loftus was engaged in laying new 112-lb. rail on the Iowa division.

Bridge and Building

A. H. Handsbury, water service foreman on the Atchison, Topeka & Santa Fe at Las Vegas, N.M., has been promoted to the newly-created position of general foreman of bridges and buildings and water service, with the same headquarters, in accordance with a redistribution of territories.

A. Love has been appointed acting bridge and building master on the Dauphin division of the Canadian National, to succeed **C. Carver** who has been transferred to the Portage-Brandon division, with headquarters at Fort Rouge, Man., to replace **H. Amos,** who has retired. Mr. Love's office is located at Dauphin, Man.

John B. Whiting, who has been appointed master carpenter on the Chicago, Rock Island & Pacific, with headquarters at Kansas City, Mo., as reported in the July issue, has been identified with this company for 17 years. He was born on April 13, 1895, at Winterset, Iowa, and entered the service of the Rock Island in August, 1919, as a rodman. He served in this capacity and as a masonry inspector and instrumentman until March, 1924, when he was made an assistant engineer. From August to October, 1930, he held the position of roadmaster, then returning to the position of assistant engineer, in which capacity he remained until his recent appointment as master carpenter, which was effective on June 20.

Obituary

T. A. Winborn, road supervisor on the Illinois Central, with headquarters at McComb, Miss., died on August 18.

Andrew Mahoney, roadmaster on the Missouri-Kansas-Texas, with headquarters at Coffeyville, Kan., died of heart disease on August 18 at the railroad company's hospital at Parsons, Kan.

L. C. Smith, supervisor of bridges and buildings of the Indiana Harbor Belt, who died on July 9, as announced in the August issue, was born on June 14, 1871, at Pickering, Mo. He entered railway service in June, 1892, as a bridge carpenter on the Indiana, Illinois & Iowa (now incorporated in the New York Central Lines). Ten years later he was advanced to bridge foreman and in 1906 he went with the Chicago, Indiana & Southern (now also included in the New York Central Lines), in the same capacity. In 1911, Mr. Smith was appointed general bridge and building foreman of the Indiana Harbor Belt, holding this position until 1918 when he was made supervisor of bridges and buildings of this road. In 1932 his jurisdiction was extended to include the Chicago River & Indiana.

Col. W. B. Causey, who was formerly connected with various middle-western railroads in engineering and operating capacities, died at Chicago on August 10 at the age of 71 years. At the time of his death, Col. Causey was vice-president of the White Construction Company and the M. E. White Company, general contractors. Born in Suffolk, Va., Col. Causey spent may years in railroad service. He served the Chicago & North Western as a roadmaster and later as assistant division superintendent, then going with the Chicago Great Western, where he held the positions of division engineer, engineer maintenance of way and superintendent. During the war Col. Causey served in France as a captain of the 17th regiment of engineers. Following the

(Continued on page 562)

war he became technical adviser on railroad matters to the Austrian government and gained prominence for his work in that capacity. From 1923 to 1925 he was city manager of Norfolk, Va. Since the latter year he has been connected with the White Construction Company and the M. E. White Company.

Moses Burpee, consulting engineer of the Bangor & Aroostook, and formerly chief engineer of this company, died at his home at Houlton, Me., on August 18. Mr. Burpee was born in 1847 at Sheffield, N.B., and entered railway service in 1869

Moses Burpee

as a rodman on the European & North American (now part of the Canadian Pacific), later serving as junior assistant and station agent. From 1871 to 1877 he was engaged on the location of the Prince Edward Island (now part of the Canadian National) and the New Brunswick (now part of the C.P.R.). In April, 1879, Mr. Burpee entered the service of the Chicago, Milwaukee, St. Paul & Pacific as a draftsman, and later served as assistant engineer and engineer in charge of surveys. In 1883 he went with the Canadian Pacific on the construction of the Western division, and during 1884 he was in charge of surveys for the Central of New Brunswick (now part of the New Brunswick Coal & Railway Company) and the Short Line Railway of Maine. In 1885 he was appointed chief engineer in charge of maintenance of the New Brunswick and the Atlantic division of the Canadian Pacific. Mr. Burpee was appointed chief engineer of the Bangor & Aroostook in 1891, holding this position continuously until 1928, when he retired with the title of consulting engineer.

Z. H. Sikes, assistant engineer of structures on the New York Central, with headquarters at New York City, died on August 1 at his home in Yonkers, N. Y. Mr. Sikes was born on March 5, 1874, at Suffield, Conn., and was graduated from Sheffield Scientific School, Yale university, in 1898, with the degree of Bachelor of Philosophy. He entered railway service in July, 1898, with the Pennsylvania lines west of Pittsburgh, as assistant engineer in the maintainance of way department and later was promoted to designer and draftsman in the office of the bridge engineer. In September, 1901, he left the Pennsylvania to join the Riter-Conley Manufacturing Company as detailer on various types of steel structures, and later was promoted to designer in the bridge department. In March, 1906, he entered the service of the New York Central as a designer and estimator on various railroad structures, and in 1910 was promoted to assistant engineer of structures in which capacity he was engaged in the preparation of designs and general detail plans for various kinds of railroad and highway bridges. In this posion, which Mr. Sikes held until his death he had an important part in several undertakings of considerable magnitude, such as the bridge carrying the Hudson River Connecting Railroad over the Hudson river at Castleton, N. Y., several Strauss trunnion bascule railroad bridges; the bridges of the track elevation and elimination of grade crossings through the City of Syracuse, N. Y., and the bridges for the extensive West Side Improvements in New York City.

Frederick E. Schall, consulting bridge engineer of the Lehigh Valley, and formerly bridge engineer of this road, died at his home at Bethlehem, Pa., on August 6. Mr. Schall had been identified with the Lehigh Valley for 53 years. He was born on December 19, 1857, at Wurtemberg, Germany, and was educated at the Royal Trade School, Stuttgart, Germany,

Frederick E. Schall

which he attended from 1873 to 1878. Mr. Schall worked on various railroad construction projects in Germany and served in the German Army, from which he was honorably discharged on November 7, 1880. In 1881 he came to the United States and, after serving for a time as a stone and marble cutter, he entered the service of the Lehigh Valley as a draftsman in the engineering department. Four years later he was made a draftsman and designer in the bridge department. In 1888 he was promoted to chief draftsman and in 1897 he was further advanced to assistant engineer in charge of the chief engineer's office. Two years later Mr. Schall was promoted to bridge engineer, which position he held until 1929 when he was made consulting bridge engineer. Mr. Schall was a past president (1911-12) of the American Railway Bridge and Building Association and was active in other engineering societies.

Supply Trade News

Personal

Alfred M. Wood, general superintendent of Teleweld, Inc., with headquarters at Chicago, died of a heart attack at his home in that city on August 10 at the age of 46 years.

Peter M. Lorenz has been appointed district sales manager at St. Louis, Mo., for the **Inland Steel Company. Frederick A. Ernst** has been appointed assistant manager at the same point. This company has established a Chicago district sales office with **Leon C. Reed** as district sales manager and **Otto G. Neumann** as assistant district sales manager.

E. I. Hetsch, formerly assistant to chief mechanical engineer of the Nathan Manufacturing Company, has been appointed sales engineer of the **Q & C Company,** with headquarters at 90 West street, New York. Mr. Hetsch was educated at John Hopkins University and graduated from the Institute of Machine Design at Karlsruhe, Germany. He entered railroad service in 1920 with the Chesapeake & Ohio and after serving in various capacities was assigned to special work in a study of locomotive lubrication.

Trade Publications

Tools for Bridge and Building Work.—The Ingersoll-Rand Company, New York, has published a 16-page illustrated booklet which lists and describes the various pneumatic tools manufactured by this company that are adapted to use in bridge and building work.

Koppax Black Paint—A small folder issued by the Koppers Products Company, Pittsburgh, Pa., illustrates various uses of Koppax Black Paint and sets forth its advantages from the standpoint of its resistance to water, heat and corrosion, its elasticity and economy in application to metal surfaces.

Drainage Products.—This is the title of a 48-page illustrated catalog, recently published by the Armco Culvert Manufacturers Association, Middletown, Ohio. This booklet describes and gives the applications of Armco corrugated pipe, paved invert pipe, standard and Hel-Cor perforated pipe, Multi Plate pipe and arches, part circle culverts, Calco drainage gates and other drainage products.

Combined Catalog—The American Brake Shoe & Foundry Company, New York, has issued a 32-page bulletin (No. 36) illustrating the diversified products of its 13 subsidiary companies, including the trackwork of the Ramapo Ajax Corporation. Among other products applied in the construction and maintenance of railway fixed properties are armored concrete curbing, catch basin castings, manhole covers, wheel guards, bridge pedestals, crossing signals, metal highway crossings and manganese steel castings.

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